

**University of Latvia
Faculty of Humanities**

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**TERM FORMATION AND APPLICATION IN
THE THEMATIC FIELD “ENVIRONMENT AND
ECOLOGY”: CONTRASTIVE ANALYSIS**

**TERMINU DARINĀŠANA UN LIETOŠANA
TEMATISKAJĀ LAUKĀ “VIDE UN EKOĻĢIJA”:
KONTRASTĪVĀ ANALĪZE**

Doctoral Thesis

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Declaration of Academic Integrity

I hereby declare that this study is my own and does not contain any unacknowledged material from any source.

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Signed:

ABBREVIATIONS

BT Broader Term

GTT General Theory of Terminology

ISO International Organization for Standardization

IT Information Technology

LSP Language for Special Purposes

NT Narrower Term

SL Source Language

ST Source Text

TA Target Audience

TL Target Language

TT Target Text

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Introduction

Terminology, as a scientific discipline, started to develop dynamically in the first half of the 20th century, when linguists and experts acknowledged the necessity to define, classify and study the relevant principles, which help them perform terminology analysis and identify the main methods and approaches suitable for investigation of the variety of newly created terms. The technical boom, globalization and development of new technologies lead to the creation of novel terms that are required to denote these phenomena and describe changes taking place in the related scientific disciplines.

The development of language is a never-ending process, as novel concepts and terms denoting them constantly appear, however, this process has recently started to expand on a much larger scale and within shorter periods of time, and as a result, terms are often created on the spot for a particular occasion and also via translation. Therefore, there is a lack of constantly upgraded LSP dictionaries, unified terminological registers and databases.

Today the question of analysing terms and recording them in the LSP sources is a frequently discussed theme, especially in such topical fields as environment and ecology. The thematic field “environment and ecology” has been chosen for the present research due to different reasons. The organization of the terminological system of the thematic field under discussion is caused by structural representation of the numerous scientific disciplines the present thematic field includes. The development of terminology of the field most vividly illustrates the contemporary tendencies in the process of novel term formation, thus, reflecting different aspects of the multilingual interaction among various communities as well as challenges faced by the translators working with the particular texts.

Texts on the issues of environment and ecology are rich in terms, which are context-sensitive, vary across registers and possess many intra-field synonyms. The

difficulties with incomprehensible and misleading terms cause problems in their application and, thus, demand a thorough analysis of modern term formation patterns and investigation of their application in the texts. Study of the neglected or unconsidered term creation patterns can help experts avoid serious mistakes in communication and, hence, translation.

There have been several attempts since the beginning of the 20th century to clarify the relations between scientific technical concepts and entry terms in the thematic field “environment and ecology”. As a practical outcome of those studies a variety of monolingual (mostly in English) dictionaries have been compiled. They can be roughly divided into two groups, each group was characterised by the presence of similar shortcomings.

The authors of the first group of dictionaries did not take into account the pragmatic perspective of communication. It was typical of the dictionaries compiled in the period of 1950s – 1990s, as they followed the traditional principles of term formation and description.

The second group of the dictionaries produced after the 1990s, considered the context of situation for the particular term, but since it was quite difficult to restrict the present thematic field, the dictionaries led to more confusion. They included one particular meaning of an entry term and the context of its application, but could omit the other possible meanings and their contexts.

The majority of the printed monolingual dictionaries in Latvian on the respective theme dates back to the 70s and 80s of the 20th century and were compiled under the strong influence of the Russian language. The latest printed multilingual (English – Latvian) dictionaries in the present thematic field as well as a variety of the dictionaries in the related scientific fields (e.g. forestry, agriculture, medicine, etc.) appeared at the very beginning of the 21st century.

With the progress in computer linguistics many online terminographic sources, containing environmental and ecological terms, appeared, still the lists of the terms are incomplete and they are not upgraded on a regular basis.

These factors call for creation of modern printed and electronic dictionaries. In order to fulfil this task a comprehensive analysis of environmental and ecological terms has to be performed, with the intention to clarify modern trends of the development of environmental and ecological terms, as well as their use in contemporary texts. The necessity to investigate term application in a text is conditioned by the fact that such characteristics of a modern term as the precise meaning, correctness of its application and its appropriateness in the text, are highly context-sensitive and depend on the textual environment. A thorough investigation of the textual environment is a pivotal stage of a detailed lexical/terminological analysis and an absolute prerequisite for contrastive studies.

The author of the Thesis puts forward the following **hypothesis**:

In the thematic field “environment and ecology”, as well as in other thematic fields in rapidly developing scientific domains, the modern patterns of term creation are much varied in comparison to the patterns typical of traditional scientific disciplines; The lexical units and expressions, used to denote scientific and technical concepts, created by following the contemporary patterns are polysemous, context-dependent, based on semantic shifts and/or stylistic devices, they, nevertheless, are to be considered terms.

The **aims** of the present research are:

- to investigate the complicated phenomenon of term creation from the theoretical perspective and analyse the traditional principles of term formation, their description and application in order to re-evaluate them and formulate the principles relevant for the contemporary terms;

- to consider various opinions of scholars on terminology application in different types of texts/contexts, in order to evaluate the influence of the standards of textuality and contextual factors on the use and development of terms of the thematic field “environment and ecology” both in authentic and translated texts;
- to study term formation patterns relevant for the thematic field “environment and ecology” in the English language, in order to describe the challenges they could present in the process of terminology application/translation into the Latvian language.

In order to achieve the aims the following **tasks** were set:

- to select the environmental and ecological terms from authentic scientific and technical texts (projects, manuals, textbooks, instructions) written in English and from monolingual (English) as well as bilingual (English – Latvian) dictionaries.
- to perform theoretical and practical analyses of terminology: a structural-semantic analysis of terms, main aspects of their application;
- to investigate and analyse theories in order to provide a theoretical basis for the notions of context, text and its dimensions and standards;
- to analyse the contemporary dominant term formation patterns in both languages (English and Latvian) in the present field;
- to define main factors that influence the development of the terminological system of the present thematic field in the English and Latvian languages.

Methods of Research

In order to prove the hypothesis, achieve the aims and fulfil the set tasks, the following contrastive and semantic analysis research methods have been applied:

- *analytical survey* of the selected theoretical sources on the subject of the research, in order to establish the theoretical foundation for the present study and provide various opinions of the scholars investigating the particular subject;
- *textual analysis*, in order to understand the manifold nature of the text and analyse the application of the environmental and ecological terms;
- *semantic analysis* of terms and terminological expressions, coined by applying various methods of meaning formation;
- *pragmatic analysis* of the context-sensitive lexical items, considering the linguistic and extra-linguistic aspects of their application;
- *semantic field analysis (and thematic field analysis)* for better comprehension of the interdisciplinary nature of the present domain;
- *structural analysis* of lexical items belonging to the thematic field “environment and ecology”;
- *componential analysis* for the purposes of translation with the aim to select the more appropriate target equivalent;
- *contrastive analysis* of the selected terms and terminological expressions in both languages.

The Topicality of the Research

A variety of novel terms enter the Latvian language as borrowings from the contact languages. The number of environmental and ecological terms in the language constantly increases, however, there is no research, which would summarise, describe and analyse theoretical principles relevant for the formation of the modern terms. The author of the present Thesis is the first in Latvia to conduct the extensive, but at the same time detailed, research on the semantics of environmental and ecological terms

in the contrastive aspect (in the English and Latvian languages). The Thesis also provides many term formation models, which are empirically illustrated.

The topicality of the present research is conditioned by the following factors:

- in order to describe contemporary tendencies in terminology, modern term formation and application principles have been elaborated, which are compared to the principles proposed by the representatives of the traditional terminology schools, on the basis of terminology of the thematic field “environment and ecology”;
- the author of the Thesis has presented the theoretical and practical basis for the elaboration of contemporary term formation and application principles, by performing the structural-semantic analysis of modern terms in the thematic field “environment and ecology”. These principles have been integrated in the study course “Terminology and Terminography”;
- the author has designed the textual model of contemporary scientific and technical text, in which various levels and dimensions of a text are mutually linked. It enables to study application of terms of the thematic field “environment and ecology” in different types of the modern texts;
- the author has analysed the use of terms of the present field in other scientific and technical domains, in order to demonstrate, challenges, connected with the application of the terms, faced by the experts, translators/interpreters.

The Theoretical and Practical Significance

The **theoretical significance** of the research is conditioned by the fact that it:

- presents a systemic view of the theoretical foundation of the traditional principles of term formation;
- offers and describes the basic principles of the contemporary term formation;

- studies the notion of the terminological concept and its possible representation within the context of the particular thematic field;
- provides a model of textual environment, which can be used as a basis for further investigation of the technical text characteristics in the field of text linguistics;
- investigates the role of context in the development of the contemporary terminology;
- contributes to the further development of the theoretical background of terminology of the thematic field “environment and ecology” by analysing the most productive models of term formation, by investigating the structural organization of the terms in the present thematic field, as well as by studying the application of these terms both in the English and Latvian technical texts.

The **practical significance** of the research is determined by the following factors:

- a comprehensive structural semantic analysis of the terms has been performed. The investigated terms form the basis for the dictionary of environmental and ecological terms;
- the principles of term formation and application, elaborated in the Thesis, can be applied in the further research;
- the performed research provides the theoretical basis for designing undergraduate and postgraduate courses in terminology/terminography, semantics, pragmatics, contrastive studies, technical translation, etc.;
- the empirical results of the research may be used for educating students mastering in the fields of environmental science and ecology, environmental engineering, environment protection and other related scientific disciplines, (e.g.: biology, climatology, forestry, etc.), as well as for instructing experts implementing research projects or working in the respective scientific and technical fields.

The Structure of the Thesis

The present Thesis “*Term Formation and Application in the Thematic Field “Environment and Ecology”: Contrastive Analysis*” comprises an introduction, three chapters, conclusion and a list of reference sources. It also includes three appendices, containing index of the terms mentioned in the present research, the list of the author’s publications and the list of the author’s presentations on the topic of the research.

The total volume of the Thesis is 198 pages, not including the appendices, which amount 59 pages. The present research is illustrated by 18 tables and 4 figures.

In the introduction the author of the present research states the hypothesis and provides the aims and tasks of the survey. The introduction also explains the topicality of the selected theme and describes the novelty of the present study, enlisting the methods of research and emphasizing its theoretical and practical significance.

Chapter 1 “*Terminology: Theory and Methodology*” is devoted to the theoretical survey of terminology as a scientific discipline, it offers a brief description of the opinions on the status of terminology, provides the analysis of the traditional principles of terminology formulated in the first half of the 20th century. This chapter also deals with investigation of the contemporary trends in terminology and describes the modern principles of term formation proposed by the author of the research. The chapter reveals the complicated nature of the notion of a terminological concept, and provides an insight into the theory of semantic and thematic fields. It also reveals the classification of the lexical items within the thematic field “environment and ecology”. This chapter represents the main theoretical contribution to the field of research.

Chapter 2 “*Text Analysis: Theory and Methodology*” offers the description of the notion of a text adapted to the purposes of the present research. The chapter reviews the ideas of various scholars on the phenomenon of text typology, which, for the sake of clarity and convenience, are enlisted and organized in the form of a table. This chapter also provides an insight into the theory of the standards of textuality, with a special emphasis on the linguistic, i.e. content-centred standards, with the purpose to

analyse the implementation of the terms in the text. It also identifies the major directions in which environment-related texts are produced, as well as the main characteristic features inherited from these directions for each type of the text. The model of textual environment constructed for the purpose of the present research contributes to the detailed exploration of the texts and may be used as a basis for further research conducted in the field of text linguistics. For the analysis of modern term creation and application the concept of context is relevant as the main concept of pragmatics.

The first two chapters present the theoretical core of the present research and form the necessary basis for the third chapter of the study, which includes the empirical analysis of the patterns of term formation in the thematic field “environment and ecology” in the English language and the investigation of the further application of the terms in the English and Latvian languages.

Chapter 3 “*Contrastive Analysis of Terminology in the Thematic Field “Environment and Ecology”*” deals with different aspects of semantic analysis of the environmental and ecological terms. This chapter provides a contrastive investigation of the main meaning formation patterns used to coin new terms in the present thematic field, illustrating them with relevant examples in both languages. It describes the significant semantic relations, typical of the terms in the thematic field “environment and ecology”, with the focus on the analysis of intra-field synonymy, as being one of the unique characteristic features of the present field. This chapter also provides structural analysis of environmental and ecological terms. The varieties of the symbolic representations of the terms have also been considered and empirically supported in order to discover the manifold nature of the terminology in the present thematic field. This chapter offers a practical insight into the pragmatic side of multilingual communication, by describing the role of the context in the clear comprehension of the meaning encoded in the term.

The concluding part of the research outlines the main findings and provides suggestions for further studies on the present subject.

Appendix I contains a list of the analysed terms. The author of the present Thesis has not listed all terms of the thematic field “environment and ecology”, but attempts to provide a selection of terms, which illustrate the modern trends in terminology. The number of terms thus is limited to 395, which are arranged in the alphabetical order. The index comprises terms in English, their definitions (one or more for each term) with relevant sources and their corresponding equivalents in Latvian (if any).

The Approbation of the Research

- The theoretical results of the investigation and the selected empirical material of the Thesis have been discussed and approved at the meetings of the Council of the Institute of Languages, Riga Technical University. They were applied in the following courses for the students of the bachelor and master study programmes “Technical Translation”: Terminology and Terminography, Business and Legal Terminology, Semantic and Pragmatic Aspects of Translation, Translation of Special Texts, Translator’s Skills, Translation of Legal Texts.
- The theoretical aspects and empirical results of the present research have been reflected in thirteen publications (see “Publikācijas par promocijas darba tēmu”). Thirteen presentations on the topic of the research have been made (see “Referāti par pētījuma rezultātiem”).
- The investigation results have been used in the course book “*Nozīme valodā: lingvistiskie un ekstralingvistiskie aspekti*”, written by D. Nītina, L. Iljinska and M. Platonova (Riga, 2008).

1. Terminology: Origin and Development

1.1. Terminology as Autonomous Scientific Field

Terminology as a scientific discipline is a separate branch of linguistics. It emerged in the first half of the 20th century, when scientists recognised the need to systemize different approaches to a term analysis and define the relevant principles characteristic of modern terminology creation and use, which can help process the variety of terms.

The status of this scientific discipline remained undefined for a long time, since there were scientists (e.g. Dubuc, 1997, Sager, 1990), who believed that terminology was nothing new but just a different perspective of lexicology and lexicography adapted to the needs of the Language for Special Purposes (LSP). In their opinion, terminology cannot be considered an independent scientific discipline as it has the same theoretical basis as lexicology. J. Sager (1990) argues that there is no *“...substantial body of literature which could support the proclamation of terminology as a separate discipline and there is not likely to be. Everything of import can be said about terminology is more appropriately said in the context of linguistics or information science or computational linguistics.”*

The role of computer technologies in the development of terminology can hardly be overestimated. The variety of modern technically complicated software programs for information processing facilitates retrieval, classification, collection as well as application of terms. Methods used for the analysis of terms are not theoretically different from the ones employed by the lexicologists/lexicographers, but they are used to achieve different empirical results and for distinct practical purposes, yet *“...practices however well-established, do not constitute a discipline...”* (Sager, 1990).

There are other researchers (Temmerman, 2000; Cabre 1999), who consider terminology to be an independent scientific discipline. According to R. Temmerman (2000: 2) terminology as an autonomous scientific discipline is first defined, perceived and thus, is considered to be established by E. Wüster in 1959 and his successors, e.g., H. Felber (1984), C. Lauren & H. Picht (1993), who represent the Austrian school of traditional terminology. E. Wüster (1991) considered terminology to be a branch of applied linguistics, “...*the general scientific study of terminology is largely influenced by its relationship to applied linguistics, of which it is a branch*”. H. Felber (1984: 31) was one of the first scientists to claim a separate status for the science of terminology.

This assumption is supported by Roger Goffin’s (1985: 9-29)¹ opinion that, “...*terminology as a discipline is one of the privileged branches of applied linguistics...*”, which is a multidisciplinary science “...*located at the crossroads of a large number of subdisciplines of linguistics (semantics or differential lexicology, among others) ...*”. T. Cabre (1999: 29) suggests that “...*applied linguistics views language as a heterogeneous system of dialects and functional varieties, and allows us to place terminology as one of its branches since it is a part of one of the functional subsystems determined by subject specialization*”. The fact that terminology as a scientific discipline is based on other related linguistic branches makes the process of representing a special meaning a social practice. R. Goffin (1985: 9-29)² supports this idea stating that, “...*terminology is closely linked to an activity carried out within the field of knowledge and thus it is inseparable from its social context and its obvious applications*”.

Thus, the autonomy of terminology as an independent discipline has been disputed; however, it cannot be denied that terminology has its own well-established theoretical basis and clear empirical purposes (compiling vocabularies, glossaries, dictionaries, data banks).

¹ In Cabré C. M. Teresa (1999:11) *Terminology: Theory, Methods and Applications*. Amsterdam/Philadelphia: John Benjamins.

² In Cabré C. M. Teresa (1999:11) *Terminology: Theory, Methods and Applications*. Amsterdam/Philadelphia: John Benjamins Publishing.

The terminology is semantically limited to one particular field of knowledge (terms are clearly defined and positioned in the system of terms of the particular scientific field), but today it also has the pragmatic restrictions, which regulate the choice of terms, their obvious applications, as well as their role in the interpretation and understanding of the communicative settings (monolingual, multilingual, intercultural, etc.) and impact of context (linguistic, social, cultural, political, etc.) on their communicative functions.

Thus, the modern insights in the research on the dynamics of term creation call for the necessity to investigate terms mainly on the contrastive basis and, predominantly, from the interdisciplinary perspective, applying various methods typical of different scientific disciplines.

The thematic field “environment and ecology” has been chosen for the present research because the structural representation of the terminological system of this field depends on the organization of the scientific disciplines it includes. Therefore, the development of terminology of this field most clearly demonstrates the contemporary tendencies in the process of novel term formation and use. The choice of the terminology of the thematic field “environment and ecology” as the subject for the research is also conditioned by the lack of both theoretical and empirical contrastive studies on the contemporary trends of terminology formation and application in English and their further implementation in the Latvian language. The present study reflects the different aspects of the international communication as well as challenges faced by the experts and translators working with the texts in the particular field.

1.2. Terminological Unit

The subject of terminology is a term. The main function of a terminological unit (single word, expression, symbol, formula, etc.) is to designate a concept in the particular field of knowledge.

Despite the fact, that the notion of a term has been studied by many linguists and terminologists (Akhmanova 1966/1996; Miyajima 1981; Shelov 1982; Felber 1984; Picht and Draskau 1985; Sager 1990/1998, Cabre 1993/1999; Desmet & Boutayeb 1994; Kageura 2002; Temmerman 2000, etc.) there is still no unified approach to what a term is, and there exist a variety of definitions. They can be universal or defined for the purposes of the particular research, be general or with the emphasis on the particular aspects.

According to O. Akhmanova (1996) a term is a word or expression of special (scientific, technical, etc.) language, which has been coined (accepted, formed, borrowed, etc.) in order to express special notion and designate special subject.

T. Cabre (1999: 35) defines a term comparing it with the notion of a word. She states that if “...a word is a unit described by a set of systematic linguistic characteristic and has the property of referring to an element in reality...”, then “...a term is a unit with similar linguistic characteristics used in a special domain...”. The similar approach has been adopted by J. Sager (1990: 123), who suggests that “...terms differ from general vocabulary, even though both are ‘words’...”. J. Sager (1990: 124) emphasizes that unlike the words, terms “...declare concepts in technical communities. And they declare those concepts monosemously... The meaning of any term has to be “defined” and the use of the term “standardized” if it is to be an item of terminology...”.

L. Bowker (2009: 286-9) emphasizes the term-concept link, stating that “...terms are linguistic designations assigned to concepts. Because terminology deals with specialised domains of knowledge, terms refer to the discrete conceptual entities,

properties, activities or relations that constitute knowledge in a particular domain...”. The same view is accepted by B. Bessé & B. Nkwenti-Azeh (1997), who define a term as a lexical unit consisting of one or more than one word which represents a concept inside a domain.

The ISO concept database³ provides a variety of the definitions of a term depending on the purpose of the document and the object of the analysis:

- Universal definition – *a term is a verbal designation of a general concept in a specific subject field. A term may contain symbols and can have variants, e.g. different forms of spelling.* - ISO 1087-1:2000 - Terminology work -- Vocabulary: Theory and application
- For the needs of recording of information – *a term is a word, phrase or symbol used to denote a concept.* - ISO 999:1996 - Information and documentation -- Guidelines for the content, organization and presentation of indexes.
- For the needs of compiling data bases – *a term is a linguistic construct in a conceptual schema language that refers to an entity.* - ISO/IEC 2382-17:1999 - Information technology -- Vocabulary: Databases
- For the needs of analyzing computer applications in terminology – *a term is a designation of a defined concept in a special language by a linguistic expression.* - ISO 12620:1999 - Computer applications in terminology -- Data categories

The validity of every definition should be theoretically based and supported by the empirical material. However, any of the definitions proposed by the researchers can be considered controversial and even provisional outside the context of the study it was actually formulated for. Therefore, for the needs of the present study the author proposes the following definition of a term:

³ Retrieved from <https://cdb.iso.org> in September 2009

Term is a word, expression or symbol that is defined within a thematic field and used to designate special meaning in the context of this field.

The terminological unit has a variety of manifestations: words, collocations, abbreviations, acronyms, symbols, icons, however, ideally behind every terminological unit “...*there should be a clearly defined concept which is systematically related to the other concepts that make up the knowledge structure of the domain...*” (Bowker, 2009: 286). The concept usually possesses a number of characteristics relevant to represent special knowledge encoded in a term.

1.3. Terminological Concept

Every terminological unit can be represented on three axes: the designation, the concept and the referent. The designation of a terminological unit is its form, which allows us to approach term-formation patterns and rules as well as restrict these combinations if necessary. Through the axes of meaning we get access to the semantic system of a language, as “...*meanings of individual signs are not isolated in the speaker’s mind, but form ordered semantic sets together with other meanings...*” (Cabre 1999: 39). The ability to arrange related meanings into sets allows people to store a large amount of information and use it when necessary.

When analysing terminology it is significant to investigate the notion of a concept, as “...*the terminology of a branch of science is not simply a sum total of its terms but a definite system reflecting the system of its notions...*” (Arnold, 1986:231). The analysis of concept-referent connection is the most difficult part of the analysis, and it is possible only to propose hypotheses and search for indirect empirical proofs, because we can only assume how individuals know the world and perceive it. This

creates a rather controversial situation, because it is not proved whether reality exists on its own objectively, or it has only right to exist through someone's individual perception. On the contrary, the relation of the designation – concept is the one which has been studied more precisely during the second half of the 20th century, but there is still room for research. This connection is especially important in terminology, as it “...concerns the question of the possible ambiguity of signs...” (Cabre 1999: 40).

The concept has a number of characteristics, which are typical of the particular object and it is assumed that the concept existed prior to its designation, while meaning, following the Saussure model, is inseparable from its signifier, i.e. its sound image (cf. Saussure 1959). A concept represents a certain amount of information, i.e. knowledge about something. Thus, if we distinguish between a terminological concept and, the so-called general concept, then it is logical to presuppose that these concepts do not just differ by their primary goals (to denote an object, and to denote a process), but also by the structure of knowledge they possess. It leads us to the logical conclusion that a terminological concept differs from a general concept in the way how the knowledge possessed inside is represented.

According to the frames and scripts approach, developed by M. Minsky (1975), as well as R. Schank and R. Abelson (1977), knowledge can be represented in frames and scripts, where frame is “...*simply a data structure that holds pieces of information together in its slots...*”, while script is “...*a structure that encodes knowledge about the appropriate sequence of events in a stereotypical situation or a story...*” (Schank and Abelson, 1977: 36-68). It means that frames are capable of representing a kind of conceptual knowledge, which is individuated by the contents of the slots, i.e. frames can be wide or narrow, in other words, general or very specific. The frame-based representation allows us to encode knowledge faster and understand how things are related and associated with other things.

It means that frames try to explain the nature of information they have about a certain thing, while scripts concentrate on the form of information, i.e. how and in

what order it is presented. This trait allows us to recall the whole object or process when remembering only definite aspects about the particular term, this kind of process is called spread activation, when a concept spreads its activation to other semantically related concepts (Anderson 1995, Thagard, 1996: 63), e.g., the concept of sea activates the concept of water. The role of the spread activation is significant for the visual concept representation. E. Drezen (1936/2002) was one of the first terminologists, who proposed to adopt the semiotic perspective to terminology description and standardization. He suggested that in terminology (nomenclature) of the parts of mechanisms, it was possible to complement definitions with sketches and pictures.

However, different types of visual representation are aimed at different results:

- *pure symbolic representations*, such as symbols, call for a specific frame but a general script – has a general order of specific knowledge about the object, which is represented in a socio-cultural specific way (different symbols of the sea in different cultures and centuries);
- an *image* or an abstract picture is aimed at activation of the general frame and general script – they are aimed at creating an abstract association about the particular object, usually because people either have no background knowledge (children), or precision of representation (correspondence to real objects) can be omitted (picture dictionaries);
- an *art masterpiece* are represented in the general frame but a very specific script – normally masterpieces convey general, well-known information (battles, ship wrecks, etc), which is, however, represented in the definite order, i.e. based on the personal perceptions of the author;
- while *photo* or *topographic representation* will lead us to a specific frame and specific script – it is always visual representation of the

modern event, process, object, which immediately creates a specific frame of information ordered in a particular way (the shore of the Red Sea).

The analysis of visual concept representations is very important for the terms belonging to the thematic field “environment and ecology”, as this field contains a variety of symbols, which denote special meanings.

It is difficult to imagine that terminological concepts can be innate not learned, but some of them really are. It is just that we do not think about them as terms before we realize that they also have meanings (more specific, but still connected with the general one – polysemous words, or completely distinct from the general one – homonyms) in one or many fields of LSP. It means that terminological systems “...*may be regarded as intersecting sets, because some terms belong simultaneously to several terminological systems...*” (Arnold, 1986:231). It does not cause any difficulties if the meaning of the term remains unvarying, which results in constant definition of the entry term.

Most of the terminological concepts are well-known to the representatives of the particular scientific and/or technical field; otherwise no communication would have ever been possible. Concepts or notions are “...*mostly international, especially for nations with the same level of cultural development...*” (Arnold, 1986:45), while the meaning of the lexical item may be “...*nationally determined and limited...*” (ibid) It means that the understanding of the main features typical of the particular concept may vary from country to country, or could depend on the background knowledge of the user of the concept, his/her age, status and even gender. These aspects influence individual comprehension and grouping of the meanings of the particular lexical item (in case of polysemous terms), which, in its turn, impact the position of the concept in the concept system, the position of the entry term in the system of the particular language as well as the implementation of the entry term in text. These factors affect and to some extent also explain the presence or absence of “...*this or that meaning in*

the semantic system ... that may be considered equivalent in different languages, but also their respective place and importance...” (Arnold, 1986:45).

It allows us to distinguish between object-oriented and class-oriented concept representations. Class-oriented concept representations are typical of the general language, they describe general knowledge characteristic of the whole class of objects. Object-oriented concept representations can offer possibilities lacking in the general representations and understanding of the concept. They are not controversial or mutually exclusive, but mutually dependent and complementing. If in class-oriented concept representations general knowledge is elaborated in, than in object-oriented knowledge representations general knowledge is left outside. Therefore, if to consider the whole lexicon of a language from the point of view of terminology, then it “...consists of the many separate subsystems representing the knowledge structure of each subject field or discipline. Each knowledge structure consists of variously interlinked concepts...” (Sager 1990:11).

Terms are then not semantically, but thematically and conceptually linked to form the basis of a particular scientific and/or technical domain. There is no single approach of organizing concepts in the particular subsystem, this delineation is based on logical, philosophical, thematic, componential and sometimes even prototypical principles. It can be done, taking into account the relevant characteristics of the concepts and finding the ones, which are repeated almost in every concept in the subsystem, the classification can be organised around the head concept of the subsystem, or it can be based on individual perceptions.

The approach to concept classification is especially important when positioning a concept in the particular scientific and technical field with the purpose to label it with a new entry term. The process should be well-organized along the particular guidelines, so that it is easy to find a concept, link between a concept and entry term in the system, as well as build up feasible links among the other concepts in the system,

which is very significant for the purposes of contrastive analysis, technical communication and, hence, translation.

Therefore, the process of terminology creation involves not only linguists, terminologists, but also experts of the respective scientific and technical fields and computer specialists, as today terminology cannot develop without feasible computer assistance. It means that the process of terminology creation is not only complicated as regards the number of stages the entry term should go, before it gets an official status, but also with regard to the variety and number of its users, who are going to apply the term practically. The users can be both

“...the source and the target of the research process and of its results. The participation of users in the production of terminology is considered essential, not only in order to ensure the scientific and technical reliability of the work, but also to facilitate the implementation of these very terminologies...” (Cayer 1990)⁴.

The author of the paper believes that terminology can only be considered and comprehended in relation to the particular special language, and communicated to the respondents with a definite purpose, as different users of the special information, perceive, process and understand it differently.

1.4. Semantic Fields

The analysis of terminology is possible taking into consideration the grouping of categories according to the lexical and conceptual relations (based on semantic fields). The notion of *semantic field*, also referred to as semantic domain, word field,

⁴ In Cabré C. M. Teresa (1999: 19) *Terminology: Theory, Methods and Applications*. Amsterdam, Philadelphia: John Benjamins Publishing Company.

lexical field and conceptual field, has been investigated by many prominent linguists (Trier 1931, Bally 1940, Porzig 1950, Ohmann 1953, Ullmann 1957, Lyons 1963/1971, Lehrer 1974), who have defined, as well as named this phenomenon differently.

J. Trier (1931: 1-26, 1934) has investigated the history of the semantic field since the ancient times to the beginning of the 13th century. J. Trier considered that the concept of semantic field would be of practical importance for the analysis of etymology of the terms used to denote various objects of peasant life in Germany of the Middle Ages. He formulated main theoretical provisions of the theory of semantic field, which have been further developed, criticised and complemented by many linguists in various communities. J. Trier, himself, suggested to apply not the notion of semantic field, but the notions of *lexical field* and *conceptual field*.

According to L.J. Brinton (2000: 112) „...*a semantic field denotes a segment of reality symbolized by a set of related words. The words in semantic field share a common semantic property...*” or, as E. Nida (1975: 174)⁵ argues, „...*for any language, semantic domains consist simply of meanings which have common semantic components...*”.

E. Coseriu and H. Geckeler (1981) developed this idea stating that „...*lexical field is a subset of a conceptual field, involving only those concepts that have words attached to them...*”⁶. It means that a single conceptual field may be associated with different lexical fields. According to H. Wise (1997: 6) the term semantic field tends to be used in both senses (conceptual field and lexical field), and there are cases when these fields coincide. Lexical field represents the collection of the terms included in the scope of one cover term, while conceptual field unites many related concepts without any broader cover term.

⁵ In Kuyt, Annelies (1995) *The 'Descent' to the Chariot*. Volume 45. Tübingen: Mohr

⁶ In Murphy, M. Lynne. (2003). *Semantic relations and the lexicon: Antonymy, synonymy, and other paradigms*. Cambridge: Cambridge University Press.

A. Lehrer (1974) emphasizes that the term *semantic field*, which „...relates senses of words, rather than words as wholes...”, thus, analysing lexemes on the sense or meaning level. D. Welton (2000: 379), in his turn, proposes that a semantic field “...consists of two interdependent elements: (a) a set of lexemes, and (b) the paradigmatic and syntagmatic relationships between the members of that set, which form the meaning or meanings of those lexemes...”. Therefore, the terms, which belong to the particular semantic field, have established meaning relationships with one another. This assumption is based on the view proposed by J. Trier (1931: 1-29) who suggested that „...the meaning of a lexeme depends on its neighbouring lexemes and their meaning” (in Kuyt, 1995: 14). It means that terms included into the semantic field are best characterized and delimited by the meanings of the related terms and, thus, help users define and limit the meanings of other terms. F. De Saussure (1959) also considered that „...a meaning of a word can only be described in terms of oppositions and differences between neighbouring terms in a linguistic system” (in Nerlich and Clarke 2000: 129). Therefore, any word/term occupies a particular place in the semantic field. However, it should be noted that in the case of the broader semantic field there is a higher likelihood that there will be a considerable overlap of meanings between terms, which, in its turn, can result in the changes of the position of the corresponding lexeme in the particular semantic field. This opinion is also supported by A. Kuyt (1995: 12-9), who also suggested that “...a lexeme has a place in a particular semantic field, but it is not necessarily restricted to just one field...”. It means that one lexeme can appear in more than one semantic field and, thus, give rise to the existence of homonymy, as well as internal polysemy (one lexeme may take even two places in one semantic field) or external polysemy (one lexeme may take places in more than one semantic field). The creation of terms based on various stylistic devices, influences the positioning of the lexeme, e.g. metaphoric nature of the lexeme positions it within at least two semantic fields.

The analysis of semantic field can help linguists study different ways in which terminologies of the same domain are structured in two languages, as well as investigate to what extent the application of the terms (hence, translation) influences

their positions within a particular semantic field. According to A.E. McGrath (2005: 13)

“...the translation of a word into a different language inevitably involves a distortion of its original semantic field, so that certain nuances and associations present in the original cannot be conveyed properly in a translation, while new nuances and associations not already present make their appearance”...

The contemporary methods of terminology formation based on the application of various stylistic devices, make this assumption valid for the analysis of terminology as well. For instance, when translating metaphoric terms from English into Latvian, in the majority of cases they lose their metaphoric nature.

Taking into consideration the fact that semantic field encompasses both domain-specific terms, scientific technical discourse specific terms and words of general language acting as terms; there is a need for clear classification of the lexical items belonging to the semantic field, as well as for stable organization following one of the principles, e.g. *“...hierarchically, part to whole, sequentially, cyclically or with no discernible order...”* (Brinton, 2000:112).

Except for the organization of the lexical items within the semantic field following the above mentioned principles, terms may be included into the field based on the contiguity of their meanings, thus, constructing a thematic field. Thematic fields may be very broad including various lexico-semantic groups and even semantic fields. It is possible to distinguish between many lexico-semantic fields in the thematic field “environment”, some of them fall into categories common to scientific technical language, e.g., *matter, space, process, measurement, quality, condition, property, state, science*; while other categories are more specific and concern, e.g., *biology, atmosphere, biosphere, lithosphere, agriculture, forestry, climate, environmental economics, environmental protection*, etc.

The terminological system of the present domain comprises many subfields, which contribute numerous terms to the thematic field “environment and ecology”. Taking into consideration the fact that the majority of terms of the thematic field under discussion coined in the English language or other foreign languages (but mostly enter Latvian through English), a thorough contrastive analysis is required.

The necessity to investigate terminology of the present thematic field has been actively supported by the Terminology Commission of the Latvian Academy of Sciences (Terminoloģijas Jaunami Nr. 32, 2004). The systemic investigation of the present domain is complicated by the fact that its theoretical basis should be developed, taking into consideration that it is not restricted to just one field of knowledge.

The domain under discussion has not been actively analysed on the English – Latvian contrastive basis as well. Only several related dictionaries were published in Latvia ten years ago, e.g. *Vides zinības. Angļu-latviešu skaidrojošā vārdnīca*, (edited by R. Jūrmalietis, R. Ernšteins, 2000), *Vides zinību terminu skaidrojošā vārdnīca* (I. Ansone, G. Kuhare, G. Puriņa, 1999). A variety of printed terminological dictionaries in the associated scientific fields dates back to the end of the 20th century, e.g. *Latviešu-angļu-vācu-krievu ilustrētā ģeomorfoloģijas terminu vārdnīca* (I. Grīne, V. Zelčs, 1997), *Latviešu-angļu-vācu-krievu mežtehnikas, mežsaimniecības un kokrūpniecības terminu vārdnīca* (J. Dolacis, 1998), *Angļu-latviešu lauksaimniecības terminu vārdnīca* (TTC, 2000). With the development of computer linguistics many online internet dictionaries/ontologies/data banks and other terminographic resources appeared, e.g. *Vides zinību terminu skaidrojošā vārdnīca* (www.liis.lv/vi/vardn.htm), online dictionary designed by Translation and Terminology centre (www.vvc.lv), online dictionary designed by European Environment Agency (Eiropas Vides aģentūra) (www.eea.europa.eu/lv/themes) and Environmental Dictionary (EnDic) (<http://mot.kielikone.fi/mot/endic/netmot.exe?UI=ened>), which contains terms from nine languages, including Latvian. However the list of the terms in them is still insufficient and they are not upgraded on the regular basis.

The development of terminology of the thematic field “environment and ecology” most vividly illustrates the contemporary trends in the process of novel term formation, as well as reflects other tendencies in the multilingual interaction among various communities.

The adoption of the semantic and thematic fields for the description of the processes taking place in the particular domain is especially relevant for the investigation of the meaning of a lexical item, classification of the concepts and identification of the relations between concepts.

1.5. Representation of the Terminological Concept: Special Vocabulary Classification

Various levels of specialization of communication as well as degrees of its complexity correlate best with the idea of dividing special lexis into different layers.

The division of special lexis has been investigated by many prominent linguists (e.g. Herbert, 1965, Trimble & Trimble 1978, Arnold 1978, Hoffman 1985, Sager 1990, Iljinska 2004/2007). They consider that lexis in special texts can be divided into the terms typical only of the particular scientific and technical area, terms typical of scientific and technical discourse in general and general words. However, only some of them believe that words of general language can act as terminological units and have special reference to one of the scientific and technical domains.

For instance, A.J. Herbert (1965: v) divides terms into two major categories: highly technical terms (having very specialized meanings) and semi-technical or semi-scientific words which have a whole range of meanings. He does not provide a more detailed division of lexical items, but admits that terms can be used idiomatically, as well as suggests that they could be polysemous.

R.M.T. Trimble and L. Trimble (1978:92) suggest that there are highly technical terms and “...a *bank of technical terms from which all disciplines can draw...*”, a so-called basic frame of special lexical items, which have terminological load. They also admit that common words, i.e. words of general language, could have special meanings in certain scientific technical fields, therefore they could be called *subtechnical terms*, as being distinct from technical terms (coined in the traditional way).

L. Hoffman (1985: 126-127) identifies three categories of lexical items in specialised texts: subject-specific terms, non subject-specific terms and general language words. He specifies technical terms, which have special reference to one scientific domain, lexical items, which have special reference to more than one domain and words of general language, which are not terms. He believes that in most of cases general vocabulary, which has no special reference to any of the scientific and technical domains, is considered to be special only because it is used in specialised texts.

Environment-related texts are full of terms which are coined using various symbolic elements (different signs, letters from other languages, etc.) or are created by analogy or based on allusion, metaphorical and/or metonymical relations and include very many culture-specific terminological expressions which demand a unified and standardized approach to their application, and, hence, translation (cf. Platonova, 2008, 35-37). Therefore, the author of the present research proposes the following division of the layers of lexis in the scientific and technical texts referring to the environment-related field (cf. Platonova 2010b):

- *Terms of scientific and technical domain;*
- *Terms of scientific and technical discourse;*
- *Words of general language used as terms;*
- *Words of general language.*

These categories can be further subdivided into numerous groups and analysed, taking into account different intra-linguistic and extra-linguistic aspects. For the purpose of the research, the author is particularly interested in analysing terms, therefore words of general language are not going to be analysed.

1.5.1. Terms of scientific and technical domain

Terms of scientific and technical domain possess all characteristic features typical of traditional term. Each subject field has its own core terminology, which actually allows identifying the particular scientific technical domain. These terms usually possess a high degree of complexity, and are frequently used only within a particular scientific and technical field or its subfields. It means that these terms are context-independent within the particular field. These lexical units are usually monosemous, as they are free from additional meanings in the particular system of knowledge; however, they can obtain secondary meanings or shades of meanings if used in other scientific and technical fields.

Thus, each scientific and technical field relies on the basic bank of terms, representing a collection of concepts, which are grouped and classified according to their:

- *Degree of complexity* (number of meaningful components);
- *Degree of dependency on the umbrella concept* (to what extent the formulation of definitions of the subsequent concepts is dependent on the superordinate);
- *Degree of comprehension* (the role of preliminary information, background knowledge for understanding the concept behind the term).

Domain-specific terms can be divided into the following subgroups depending on the difficulty level in communication and, hence, translation:

- **Terms of scientific and technical domain, which are difficult to communicate and, sometimes, to translate** – these are monosemous terms, which are used only within the particular field, and can be understood only by the professionals, e.g. *disclimax*, *ram pump*, *zoobenthos*, *biodome*, *fumarole*, etc.

When translating these terms from English into Latvian, one encounters many difficulties finding the corresponding equivalents in the printed dictionaries, the online sources were more helpful, however, they still do not provide equivalents of some of the core terms, and/or provide close target language equivalents, which are not standardized and differ in grammatical forms. In the majority of cases, even online dictionaries and/or other sources simply provide transcribed variants of the English terms.

- **Terms of scientific and technical domain used in the derived subfields, which are easy to communicate, but sometimes difficult to translate** - such a term preserves its initial meaning, but, when used in the derived subfields, can obtain some new additional shades of meaning. Nevertheless, these terms are easy to understand, because the main meaning remains unchanged, but sometimes difficult to translate for inexperienced translators.

1. **grit:**

- *environment*: abrasive particles or granules, as of sand or other small, coarse impurities found in the air, food, water, etc.;
- *geology*: a coarse-grained siliceous rock, usually with sharp, angular grains;
- *ornithology*: sand or other fine grainy particles eaten by fowl to aid in digestion.

For translation into Latvian the following options are provided by different English-Latvian dictionaries: *smilts, grants, grauds, slīpgrauds*.

2. nest:

- *ornithology*: a pocket-like, usually more or less circular structure of twigs, grass, mud, etc., formed by a bird, often high in a tree, as a place in which to lay and incubate its eggs and rear its young;
- *environment*: a place used by insects, fishes, turtles, rabbits, etc., for depositing their eggs or young.
- *ecosystem*: a number of birds, insects, animals, etc., inhabiting one such place.

There are the following target language equivalents in the dictionaries: *ligzda, perēklis, miga, midzenis*.

- **Terms of scientific and technical domain used in the unrelated scientific technical fields, which are easy to communicate, but sometimes difficult to translate** - such a term preserves its initial meaning, but when used in other scientific and technical fields, obtains additional meanings as well. The term might be difficult to communicate in the target language (Latvian), because even despite the fact that the central meaning in the source language (SL) remains unchanged, it does not fit the context of the situation, therefore, sometimes it can be difficult to find an equivalent in the target language on the spot, e.g.:

1. tissue:

- *biology*: an aggregate of similar cells and cell products forming a definite kind of structural material with a specific function, in a multi-cellular organism;
- *polygraphy*: a piece of thin writing paper on which carbon copies are made;

- *textiles*: a woven fabric, esp. one of light or gauzy texture, originally woven with gold or silver: a blouse of a delicate tissue.

The bilingual dictionaries (both printed and electronic) provide the following translation variants: *plāns audums, audi, tikls, tīklojums, salvetes*.

2. **fin**:

- *ichthyology*: a membranous, wing like or paddle like organ attached to any of various parts of the body of fishes and certain other aquatic animals, used for propulsion, steering, or balancing;
- *aeronautics*: any of certain small, subsidiary structures on an aircraft, designed to increase directional stability;
- *metallurgy*: a ridge of metal squeezed through the opening between two rolls, dies, or halves of a mold in which a piece is being formed under pressure;
- *automotive*: an ornamental structure resembling an aeronautical fin that is attached to the body of an automobile, as on each rear fender (tail fin).

The Latvian translation variants for the present source language term are the following by different dictionaries: *spura, ķīlis, stabilizators, apmale*.

- **Terms of scientific and technical domain which are easy to communicate and translate** – such terms, although being very field specific, present no difficulties in the process of communication and translation, as they are internationalisms, or are formed using elements of Greco-Latin origin. For instance: *lithosphere, orbital, climate, domestication, ecology, ecosystem, ecotype, ecotone, biocomposite, biodegradability, bioenergetics; bioinformatics; geoscience, etc.*

1.5.2. Terms of Scientific and Technical Discourse

Terms of scientific and technical discourse – are common in the scientific and technical language. These terms are used in various, even absolutely unrelated, scientific and technical fields. However, there still should be a clear difference between **scientific lingua franca** (terms common to more than one subject field) and **general terms** (terms which are used or can be used in more than one subject field).

- **Scientific lingua franca** – terms, which constitute the core of scientific language and thus are related to any scientific and technical field: *action, agent, alternative, analysis, balance, base, channel, case, centre, class, data, degree, element, factor, item, objective, period, plan, quality, report, research, resource, risk, scale, survey, test, unit, volume, zone, etc.*

These terms present no difficulties for translators, although they can change their meanings or acquire some additional meanings depending on the field they are used in, but the original constitutive part of the meaning still remains the same.

- **General terms** – core terms of the particular scientific and technical domain, which are clearly positioned within this particular field. They can also be used in the texts on the subjects thematically unrelated to the domain they initially belonged to. It is possible to classify them into the following categories:
 - **Legal language terms** – clichés, words and phrases common to every legal document of a particular kind irrespective of its specificity (field/sphere). For example, the following legal terms are typical of any legal process or action: *appeal, evidence, complaint, liability, natural person, etc.*

- **Economic and financial terms** – typical of every benefit-based agreement, financially supported project, etc. There are plenty of terms that fall into this category, for example: *interest, value, budget, fund, benefit, human factor, externalities, rate, etc.*
- **Mathematical and statistical terms** – used in any analytical document for the purpose of calculation-based assessment of factors, for instance: *absolute value, algorithm, average, chart, graph, constant, digit, exponent, number, frequency, percent, probability, etc.*

Translation of these terms presents no difficulties, since these terms are standardized and can be easily found in both printed and electronic dictionaries. However, some of these terms have more than one meaning, which makes them context-dependent, but it does not complicate the process of communicating of information, since these are not completely distinct meanings, but just the shades of the central meaning.

1.5.3. Words of general language used as terms

Traditional terminologists imposed quite static and non-flexible norms on the use of terminology, completely relying on the facts that terminology should be studied from the onomasiological perspective (cf. Felber 1984, Svendsen 1993). Terms, in their turn, should be assigned permanently to a concept and represent concepts that are clear-cut and precisely positioned in a concept system, as well as both terms and concepts should be studied synchronically (cf. Wüster 1979, Temmerman 2000). The lexical items which did not fit into the proposed classification of terms were not considered to be terms. At present the situation has changed dramatically and terminology application norms are created and recorded based on their practical implementation.

One of the main requirements for the terms to be monosemous can be considered valid only within the frame of one particular field or even subfield. The creation of new labels for the emerging scientific and/or technical concepts is not only difficult, but also restricted by the potential of the language. It means that for naming novel concepts terminologists use the already existing language resources, i.e. they:

- “...are modifying definition of concepts which already exist (*defining exercitives*)...” (Pearson, 1998: 5), broadening or narrowing the already-in-use concepts with no need for the coinage of the new label;
- are applying words of general language to denote special concepts in the particular scientific technical field. Entry terms which are created following this term formation pattern preserve their initial meaning and acquire an additional one by analogy or based on allusion, as well as metaphorical and/or metonymical relations. The criteria for category membership can differ, as the resultant terms can be either subject specific (in the majority of cases) or non-subject specific.

Such terms according to R.M.T. Trimble and L. Trimble (1978:92) are called **subtechnical terms** – i.e., common words that have special meanings in certain scientific and technical fields. The authors have provided the following examples of subtechnical terms: *control, operation, current, ground, sense, folder, flux*.

The author would like to give some more examples from the texts on environment-related theme: *cloud, fog, fruit, walk, chain, bee, frog, beaver, mouse, bear, elephant, tree, plant, neck, back, terrace*, etc. A communicative setting is the only way to determine the status of each of the words of general language used in the text.

In order to perform a feasible analysis of terminological units of the thematic field “environment and ecology” it is necessary to formulate basic principles, which would help linguists/terminologists/experts describe the process of term formation, application and designation, as well as govern the further development of terminology. These principles have been generated by the representative of the traditional schools of terminology.

1.6. Traditional Schools of Terminology

At the beginning of the 20th century, linguists became actively involved in the process of terminology formation, since the technological progress created the need for naming new concepts and agreeing on the use of terms.

The continuously growing expansion of terminology demanded investigation of the process of term formation on a scientific basis, for terminology was recognised as a socially important activity.

It was the Austrian engineer E. Wüster who pioneered the systemic methodological approach to terminology, establishing the main standards needed to work with terminology and process it (J. Kast-Aigner, 2009). His initiative was supported worldwide and led to the formation of the three classical schools of terminology: the Austrian (or Vienna) School, of which E. Wüster was the main representative, the Prague School and the Russian School.

However, G. Rondeau (1983) considered the Russian linguist D.S. Lotte to be the real father of terminology as a scientific discipline. G. Rondeau (1983) argued that D.S. Lotte (1961) was the first to be concerned mainly about the theoretical aspects of terminology, while E. Wüster was mostly dealing with the elaboration of methodology

for compiling terminological data, which could facilitate the process of terminology standardization.

E. Wüster himself considered four scholars, representing various terminology research directions, as the intellectual fathers of the terminological theory, i.e. A. Schloman from Germany, who was the first to consider the systematic nature of special terms, F. de Saussure from Switzerland, who was the first to draw attention to the systematic nature of language, E. Dresen from Latvia, who pioneered in underscoring the importance of standardisation, J.E. Holmstrom from UK, who was instrumental in disseminating terminologies on an international scale from UNESCO and was the first to suggest the establishment of an international organization to deal with the issue (cf. Cabre, 1999: 5).

Before the establishment of three traditional schools, numerous research centres, were created, each dealing with terminology analysis relevant to the needs of the respective region, working in the particular environment and having concrete scientific and/or methodological tasks. In spite of the number of research projects and the frequency of their implementation they were irregular, non-systematic and not available for the global audience (cf. Lauren and Picht 1993: 495).

Therefore, as a result there can be identified only three distinctive, but not mutually exclusive approaches to terminology analysis:

- The Austrian school considered terminology to be an independent discipline at the service of scientific and technical fields;
- The Russian school put emphasis on the organization of knowledge and the logical classification of concept systems;

- The Czech school focused on the linguistic approach, considering terminology a subcomponent of language's lexicon and special languages as subsystems of the general language (cf. Cabre 1999:7).

Although these *traditional schools of terminology* have developed rather independently, they coincide in the majority of core aspects. Moreover, some of the linguists state that:

“...these “terminology schools” never really existed as sharply separated and isolated traditions but rather as closely connected and interactive research traditions that share a major set of theoretical assumptions, and that the differences lie in different priorities and research interests”. (Budin, 2001:17)

In the special language terms define scientific concepts, which, in their turn, should be unambiguous, easy to comprehend, context-independent, preferably monosemantic, and should still preserve their identity when translated into foreign languages. These characteristic features coincide with the main principles formulated for the traditional term, i.e.

*“...traditional terminology claims as its main basic tenets the following **five principles**: terminology studies concepts before terms (the onomasiological perspective); concepts are clear-cut and can be attributed a place in a concept system; concepts should be defined in a traditional definition; a term assigned permanently to a concept; and terms and concepts are studied synchronically...”* (Temmerman 2000: 4).

Thus, five principles of the term mentioned above, are formulated in the light of the Austrian school and then compared on the grounds of the other two schools of traditional terminology.

As the **first principle**, E. Wüster (1991: 1) in his studies emphasizes the onomasiological perspective, which starts from the content aspect of the sign, i.e. meaning, opposite to the semasiological one, which starts from the formal aspect, i.e. words (Svensen 1993: 17)⁷. The Austrian school “...*does not refer to the content aspect of the sign, but rather to the concept seen as a part of the world outside language...*” (Temmerman 2000:5). According to H. Felber (1984:103) words only become terms when they are clearly associated with the concepts they stand for, otherwise, they are not terms, but just the words in general use.

The advocates of the Austrian school also emphasize that an absolute benchmark is a fact that one term should be assigned only to one concept, and vice versa, one concept should correspond to only one term. It means that terminologists “*are concerned with imposing norms for the use of language ... and are interested in fixing and standardizing meaning in order to avoid confusion...*” (Pearson, 1998:11).

In contrast to the existing research projects and publications, whose authors were primarily concerned with the standardization of the existing terms, E. Wüster was interested in formulating principles relevant for the creation of novel terms.

According to E. Wüster (1979: 2), terminologists should start their research from concepts, not lexical units, and they should be interested in vocabulary alone, omitting the theory of morphology or syntax. He believes that terms are distinct from words not only in the terms of their meaning, but in the terms of their nature and application. However, traditional terminologists were not examining terms in use, but were establishing a clear-cut connection between a label and a concept they denote.

E. Wüster uses the word *term* to refer just to the label, while G. Rondeau (1984:19) “...*uses the word **term** to describe the combination of **denomination** and **notion** (label and concept)...*”. G. Rondeau, being a representative of the Canadian

⁷ In Temmerman, Rita (2000) *Towards New Ways of Terminology Description: The sociocognitive approach*. Amsterdam: John Benjamins.

terminology research traditions, shares the opinions adopted by the linguists in the Prague and Russian schools of terminology.

The Prague and Russian schools support the F. de Saussurian view that “*the term is the totality of content (concept) and form (name)*” (Saussure 1959). E. Wüster wants to separate the terms from the concepts, claiming that concepts can exist without language, but the Prague (Drodz 1981) and the Russian (Drezen 1936/2002; Caplygin 1937, 1941, 1942; Lotte 1961, 1971, 1982) schools consider the term a linguistic sign.

The Prague school of terminology was established as a result of functionalist linguistic approach employed by the Prague school of Linguistics, as “*...it is almost exclusively concerned with the structural and functional description of special languages, in which terminology plays an important role...*” (Cabre, 1999: 13). The representatives of this school perceive terms as lexical units that make up the functional professional style.

However different representatives of the Russian school hold distinct opinions concerning the relation of a term to a word. D.S. Lotte considers that the *term* is a special *word* (Lotte 1961). The prominent linguist from Latvia E. Drezen (1936/2002) stresses that terms are words with special meanings, but not special words. This view is also supported by G. Vinokur (1939: 5), who emphasizes that “*...terms are words with special functions, not special words...*”.

It should be noted that even despite the fact that the Austrian school tries to cut terminology loose from linguistics, it shares the view of the Prague and the Russian schools, namely that terminology shows parallels with structural linguistics and with the Saussurian theories as well.

This view can be also proved on the grounds of the **second principle**, according to which, the terms should be clear-cut, and studied as being the elements of concept

systems. The representatives of the Austrian School argue that “...*a concept should be assigned a place in a logically or ontologically structured concept system...*” (Temmerman, 2000: 16). H. Felber (1984: 120) proves this opinion by suggesting that, as every concept possesses some characteristics, it should definitely have a link with other concepts, which have a number of the same characteristics.

Therefore, all concepts can be represented as a number of elements and each element can be even recognised as an individual concept as well, which, in its turn, requires some other elements or simple words to be explained. It means that before assigning a new name to an innovative concept, one should trace its detailed hierarchical description, to outline, whether the concept under the question possesses all necessary characteristics to be easily understood by the experienced target audience (TA) and explained to young experts in the respective professional field. Classification of the concepts is of crucial importance for the process of terminology standardization, as “...*standardization demands clear identification of terms and concepts, which can be achieved with the help of classification...*” (Drezen, 1936/2002).

E. Wüster and H. Felber distinguished the following types of relationships between concepts:

“...logical relationships, ontological relationships (partitive relationships, relationships with succession and relationships of material-product), and relationships of effect (causality, tooling and descent)” (Wüster 1993: 302-330; Wüster 1991: 9-15; Felber 1984: 120-129).

E. Wüster argued that linguistics may only be able to adequately deal with the issue of the structure of meaning by engaging with logic, which studies concepts (which, in their turn under certain conditions can be equated with meaning), and shows how concepts can be related to form a structure (cf. Wüster 1979/1991).

The term *concept*, as the “...cornerstone of the *GTT* (general theory of terminology) and the starting point of any terminological work...” (Felber, 1984: 102) in respect to its essence/nature has been variously defined by many prominent linguists/psychologists/scientists/terminologists. I. Dahlberg (1976) and H. Picht (1985, 1997) made attempts to systemize the existing approaches to the understanding of a concept. A concept is “generally accepted as a unit of thought”, or sometimes as “a unit of knowledge in a particular field” or as “a unit of cognition”⁸. The view that a concept is a unit of thought is actively supported by the representatives of the Austrian School of terminology, as H. Felber (1984: 103) suggests that concept is “... an element of thinking, which consists of an aggregate of characteristics, which themselves are concepts...”. This view goes back to the analysis of the constituent elements of the meaning, which according to J. Lyons (1977) is a “combination of semantic features” and supports the theory of Saussurian structural semantics, which states that the best way to describe meaning is to recognise and describe its semantic relations with other neighbour concepts (cf. Saussure 1959).

A concept as a unit of knowledge has been actively studied by the representatives of psychological linguistics and cognitive linguistics. In the science of terminology this opinion is supported by J. Sager, who states that “...each knowledge structure consists of various interlinked concepts...” (Sager, 1990). He presents

“...a model of knowledge in the form of a multi-dimensional space made up of a series of intersecting axes, each of which represents a class of conceptual characteristics or dimensions in an intersecting relationship... In this space a concept is a unit of knowledge that is represented and identified only by the reference to the coordinates on these axes” (Cabre, 1999: 43).

However “...the value of a concept with respect to an axis is generally defined as a range and only exceptionally as a point” (Sager, 1990: 15). It means that each

⁸ In D.A. Cruse, F. Hundsnurscher, M. Job, & P.R. Lutzeier (Eds.), *Lexicology : an international handbook on the nature and structure of words and vocabularies*. Vol. 2 (pp. 1847-1854). Berlin: De Gruyter.

concept represents a set of constituent elements, which emerge in the human mind each time the concept is evoked, therefore concepts are “...*constructs of human cognition processes...*” (Sager, 1990: 22).

The approach to understanding a concept as a unit of cognition is related to the view that a concept is a unit of thought. According to C. Forsythe and P.G. Xavier (2005: 9) concepts “...*correspond to the most elementary units of cognition*”, which “...*emphasize the changes which the concept (not necessarily the term) undergoes as knowledge evolves...*” (Picht, 1997: 164-165)⁹. B. Antia states that

“...if cognition were viewed as a process, the ‘unit of cognition’ acceptance might be relevant when...a community noticed change in the intension of the concept and observed that a new concept was being derived or created” (Antia, 2000: 83).

Despite the many attempts at reconciliation of the approaches to what the concept actually is (Picht, 1997; Dahlberg 1976; Felber 1984, etc.) the author of the present research adopts the view expressed by B. Antia (2000: 83- 85) that a concept is “...*a unit of thought, knowledge or cognition, which:*

- *can be influenced by a variety of socio-cultural factors that correspond to linguistic boundaries;*
- *is a mental representation, reduction or (re)interpretation of reality that is perceptible, imperceptible or that was previously non-existent;*
- *is comprised of characteristics that are (at some point, at least) negotiated within a specialised knowledge community;*
- *typically enters into some (organic or logical) relationship with other concepts;*
- *can exist without a symbol (whether linguistic or non-linguistic), but requires symbols for purposes of communication”* (Antia 2000: 83 – 5).

⁹ In D.A. Cruse, F. Hundsnurscher, M. Job, & P.R. Lutzeier (Eds.), *Lexicology : an international handbook on the nature and structure of words and vocabularies. Vol. 2* (pp. 1847-1854). Berlin: De Gruyter.

A concept can generally be described in two ways, by specifying its intension or extension.

“Intension denotes the content of the concept, which can be defined as the combination of distinctive features which the concept comprises. Extension denotes the range of concepts, which can be defined as the combination of all the separate elements or classes which the concept comprises” (Svensen 1993: 120)¹⁰.

These two approaches help linguists delineate the concepts, as most of them are not clear-cut, as they are expected to be, but rather complicated and difficult to comprehend. It also leads to the idea that concepts are rather flexible at their early stages of formation, which also means that some boundaries have to be set to control the process and provide the desired result at the final stage, so that a term can be easily assigned to the concept. According to R. Temmerman “...*flexibility is functional in categorisation and communication, it allows for evolution of understanding*” (Temmerman 2000:8), which means that the existing concepts can be improved, specified, generalised by complementing or deleting particular elements of the concept and thus eliminating part and/or parts of the name of a term, which no longer correspond to the concept, or adding some new ones, used to coin the term, which will correspond to the concept. This view is also supported by the representatives of the other two schools of traditional terminology. The representatives of the Prague school of terminology, e.g. J. Horecky (1994) supports the opinion that a determining feature of a term is its integration into a certain system.

The **third principle** states that concepts should be defined in a traditional definition, i.e. concepts should be easily recognised as terminological definitions and the terminologists of the Austrian school outline that such a definition can be of three types: intensional, extensional and part-whole.

¹⁰ In Temmerman, Rita (2000) *Towards New Ways of Terminology Description: The sociocognitive approach*. Amsterdam: John Benjamins.

H. Felber (1984: 116) considers the intensional definition a “...*specification of characteristics of the concept to be defined*”, while the extensional definition “*consists of the enumeration of all species, which are at the same level of abstraction, or of all individual objects belonging to the concept defined...*” (ibid: 163). H. Felber’s part-whole definition is a sort of “*description of the collocation of individual objects revealing their partitive relationships corresponds to the definition of concepts*” (ibid: 164).

It is worth mentioning that the types of the definitions proposed by the terminologists of the Austrian school fully correspond to the ISO standard 704(1995) *Terminology Work – Principles and Methods*. However, in this document preference is given to the intensional definition, as it is more systematic (cf. ISO/TC 37/SCI/CD704.2 N 133 95 EN). Traditional schools of terminology (all of them) rely heavily on the definitions of concepts, which can be easily elaborated into the concept systems, therefore the intensional definition is preferred. This observation goes along with the Saussurian theory, where the preference is given to the denotational meaning (skipping the connotational one) and to the literal meaning (with no reference to the figurative meaning) of the words (cf. Saussure 1959). However H. Felber and E. Wüster state that not all terms can be defined in one of the three ways, therefore, they recognise the need for explanations, which do not express the position of the concept in the system, but communicate information required. Although they are not considered to be terms, as they lack the so-called terminological definitions.

The biggest challenge is to find or create the right term for the right concept, providing that both are unified and can be easily cross-referenced. Monosemy and mononymy of terms are essential for unambiguous and, therefore, effective and efficient communication. Thus, the **forth principle**, i.e. the univocity principle, should be observed by terminologists or experts in the respective scientific and technical field. According to R. Temmerman (2000: 10), “...*univocity means that each concept should be designed by only one term and one term should only refer to one concept...*”. It means that ‘traditional’ terminologists believe terms to be completely context-

independent and monosemantic. They analyze terms apart from the collocation/sentence/utterance/ text they are used in, even if the respective terms have originally been sourced there. The view that meaning is a concept and that unlike words in the general language, terms in the special language are context-independent corresponds to the Saussurian (1984) view that terms should not have figurative meanings.

The Austrian school has paid a great attention to the problems of terminology standardisation in the particular scientific and technical field. The founder of this school has underlined that standardisation of terminology “...has the purpose to unify concepts and systems of concepts, to define concepts, to reduce homonymy, to eliminate synonymy, and to create if necessary new terms in line with terminological principles...” (Wüster 1984:15). It was really important to standardise terms not only for the linguistic and terminological benefit, but also for pure economic and financial profit, as standardised and harmonised terminology facilitates the process of information exchange at the professional and commercial level. The standardisation process was also considered to be really important by the terminologists of the Prague and the Russian schools particularly due to similar reasons.

The representatives of the Russian school thought that it was necessary to standardize terms at a national level prior to their international standardization. E. Drezen (1936/2002) argued that, when elaborating the system of scientific designations and terms it was preferred to take into consideration the possible 1) unification in the form and meaning of the designations and terms in all fields of their application; 2) employment of the respective designations and terms at the international level.

Basically, the emphasis was put on the standardisation aspect of terminology in order to improve oral and especially written communication in special language among various cultures.

The creation of terms is complicated by the fact that this process has always involved many scientific aspects, which should be taken into consideration, such as the logical aspect (ordering of information), cognitive aspect (comprehension and processing of information), and the communication aspect (transfer of information). However, traditional terminology does not take into consideration the “...*human dimension of conceptualisation...*” (Temmerman 2000:20), it does not want to agree to the fact that “...*categories can be the result of conception in the mind and not solely of what can be perceived objectively...*” (ibid.). The role of language in thinking, processing and understanding of information is completely neglected; moreover, the theory of cognition and concept formation and naming is not exploited either. It means, that the process, which results in the formation of new concepts and their assigning to particular names has not been explained at all.

Sometimes, synonymous and polysemic terms are not only inevitable but also necessary, as they allow us to express both minor and major meaning shifts without changing the grammatical form of the term, or inventing a new one, which still should be similar to the existing one, as it refers to the same concept. This idea is illustrated in the corpus of environment-related texts studied in the present research.

The **fifth principle** under question concerns the synchronic perspective, as traditional terminologists do not study language evolution, because they focus on the concept system, which is considered to be the basis of the special language in any scientific and technical field (cf. Wüster 1991: 2). That is why traditional terminologists study language solely from its diachronic perspective. This goes along with the Saussurian view that meaning can only be described synchronically, at the particular moment (cf. Saussure, 1959). The Austrian, the Prague and the Russian schools stress that the concept should come first and, as the concept appears here and now, there is no use studying its development diachronically, which also means that the opportunity to produce polysemous terms and homonyms is strictly limited.

As the Russian school shares the views of the Austrian School of terminology (Lauren and Picht 1993: 507ff), it has also elaborated similar principles relevant for the analysis of a term, however, from the standpoint of its application, which was neglected by E. Wüster. E. Drezen (1936/2002) believes that the choice of every term should be considered individually taking into account different factors such as: frequency of use, scientific precision, conciseness of form, possible abbreviations of the complex term, correspondence of the meaning of the complex term to the meaning of its constituent lexical elements, linguistic correctness, possible collocations with determining concepts, etc.

These principles advocated by representatives of the traditional terminological schools are still valid today, but require some re-evaluation taking into consideration the impact of the:

- globalisation trends in all spheres of academic and scientific activity;
- the development of modern information technologies, i.e. compilation of electronic corpora, emergence of data processing technologies, a wide application of the electronic translation tools;
- rapid development of scientific and technical fields;
- appearance of new technologies and inventions;
- social, political, economical and other factors.

These factors lead to the emergence of new innovative concepts, which require naming in accordance with international standards, so that the term could be free from bias, easily recognised and understood abroad, as well as local standards, which help us preserve the linguistic structure and vocabulary typical of the native language.

1.7. Modern Terminology Research

Modern linguists have realized that the traditional theory of terminology has various limitations, which are connected with the process of term formation, its implementation in the text, communication and, hence, translation. Recently coined lexical items used to denote scientific and/or technical concepts in the LSP vary to a great extent in the processes of their formation. It means that modern terms are created on the basis of the elements of general language in a variety of ways. According to B.L. Raad

“...while a great deal of scientific vocabulary is still formed in the traditional method from Latin and Greek roots and affixes, more of the words of modern science manipulate common elements in ways which do not conform to the same linguistic requirements expected in the past...” B.L. Raad (1989: 128).

Contemporary scientific terms are more often created by composition from the existing lexical items (compounding, blending, clipping, affixation) or by applying various meaning formation patterns, i.e. meaning shifts (metaphors, metonyms, synonyms, homonyms, etc.). Sometimes there can be observed shifts of meanings of terms by omitting one of the meaning components, adding a new one and/or expressing the meaning in more general or more special categories. This process comprises a reciprocal change of the constituent elements between special and general languages. I. Arnold states that today

“...the everyday English vocabulary, especially the part of it characterised by a high index of frequency and polysemy, constitutes a constant source for the creation of new terms. The constant interchange of elements goes both ways.” (Arnold, 1986:233).

Even in such scientific domains where terminology is structured following the strict rules of various nomenclatures and taxonomies (e.g. biology, zoology, etc.) the

practice of creating terms by following the traditional strategies is still one of the factors which characterizes scientific vocabulary. At the same time a variety of novel terms is created according to the modern principles of term creation. It means that terminology in the respective field is dynamic (actively developing) and thus open to changes.

Terminology, which belongs to the thematic field „environment and ecology”, has recently become one of the topical spheres of terminological/linguistic investigations all over the world. Many scientists, linguists, terminologists have analysed lexical items, which nominate different phenomena in the particular thematic field. The growth of interest in this field of research is explained by a variety of factors, such as:

- the expansion of technical progress and continuous development of scientific processes worldwide, which, in their turn, have led to the establishment of a new scientific discipline, i.e. ecology, dealing with the problems of environment protection;
- the necessity to name new processes and phenomena taking place in the surrounding environment (changes in climate, ecological catastrophes, developments in geology, biology, etc);
- the importance to research terms belonging to the thematic field “environment and ecology” at the international level, in order to solve common problems in ecology efficiently;
- the evolution in biosphere and various ecosystems demands a thorough analysis of their constituent elements, their classification and systematization of their names (harmonization, unification and standardization);

- the degradation of the ecological situation all over the world calls for prompt and efficient instruments to prevent further devastation. It calls for international assistance, which, in its turn, requires unambiguous and clear communication of special information, which is structurally organized, semantically precise and linguistically correct.

Modern terminology in the environment-related fields reflects changes in all related systems of terms. It is especially important from the point of view of sociological or cognitive approach to the analysis of terminology. Ecology as a scientific discipline has emerged on the basis of biology, medicine, geography, chemistry, physics, and thus contains terminology of all the related domains.

The lack of a well-grounded structural-semantic analysis of the terms in the environment-related texts makes the process of terminology standardization and unification quite difficult, which, consequently, complicates the process of communication (translation). The global distribution of the environment-related terms in many scientific and/or technical fields demands a thorough analysis of these special lexical items at various stages of their development: formation, application and standardization.

The stage of term formation calls for identification, categorisation and a detailed investigation of patterns relevant to the present scientific field. At the stage of terminology application it is necessary to research in what way these terms can be communicated and/or translated. For standardization, they have to be examined critically at the level of concepts, which helps experts formulate their definitions and place them in the system of concepts and terms of the particular domain.

The terms in the environment-related fields cannot be described in traditional categories, due to deviations from the traditional terms in structure/form (they are binary in the majority of cases, or contain even three or four constituents) and in their

semantic representation (could be polysemous within one field, possess synonyms, variants and doublets, etc.).

Modern terminology researchers deal with many aspects of terminology analysis, which were neglected by the representatives of traditional schools of terminology. Moreover, today the principles formulated in the traditional theory of terminology are questioned and criticized to be updated, revised and even reformulated taking into consideration the needs of the contemporary tendencies in linguistics.

As it was discussed above, E. Wüster (1991: 1), the representative of the Austrian school, emphasized the onomasiological perspective, which departed from the concept, opposite to the semasiological one, which started from the formal aspect, i.e. words. Today the semasiological perspective is of the greatest importance. In the environment-related fields, especially in the fields connected with environment pollution and protection, terms are often created to name emerging scientific phenomena, before well-formulated scientific concepts appear. It leads to ***creation of many terms, which are based on analogy, allusion, metonymy, metaphor***, etc. Variations of semantic shifts, being very productive term formation patterns today, should be studied adopting the semasiological approach, as “... *if treated diachronically, semasiology studies the change in meaning which words undergo...*” (Arnold, 1986:37).

Terms, which are created by analogy, share the same primary meaning, but are distinguished by one or many secondary factors, which help us nominate scientific phenomena in a prompt and comprehensive way. For instance, the terms *red tide*, *blue tide*, *black tide*, *green tide* are all created by analogy in function (increase in the number of waterweed or other organisms in the basin, which colour the water). The environment-related terms, which are created based on similarity in other aspects are quite frequently applied in a variety of scientific technical fields, e.g. *mouse – computer science*; *elephant – economics*; *camel – technical engineering*; *frog – transport*; *dog – machinery*. Their implementation in the text as well as the

mechanism of special meaning representation in monolingual or multilingual communication are subject to semantic (including pragmatic) analysis. The role of the semantic aspect in terminology is emphasized by a number of terminologists (Picht, Draskau 1985; Skujina 2002). The semantic approach to terminology formation helps experts comprehend the concept behind the entry term, and choose the most suitable form (label) of the particular term, in order to incorporate it into the concept system and term data bank (cf. Skujina 2002: 44-62). According to J. Endzelins (1980: 9-45), when analysing the correspondence (appropriateness) of the entry term to the particular concept, the main focus should be put on the meaning of the lexical item, which is chosen to represent it.

The second principle of traditional terminology schools, according to which terms should be studied as elements of concept systems, is still valid today. Experts use entry terms to express special meanings and communicate them in real life situations. They tend to organize their knowledge into a system of concepts and establish strong links between the things they already know and the novel concepts which appear, thus they approach terminology logically and cognitively (cf. Nītiņa et al, 2008). It is essential to be aware of the relations between the professional knowledge decoded in a concept and the lexical item chosen to represent it, in other words, the creation of a new term is based on the analysis of the related concepts and lexical items. The desired result can be achieved by “...*comparing and contrasting the related concepts, as well as by examining vertical and horizontal links between concepts...*” (Pearson, 1998; 3).

Every concept possesses some characteristics and it definitely has links with other concepts in the concept system, which share a number of the same characteristics. It means that every concept system comprises a collection of thematically linked terms, which, to some extent, are mutually dependent and alterations of one concept may lead to changes in another concept in the system, but it does not obligatorily lead to changes in other concept-related designations, i.e. it should not obligatory result in the change of the names of the concepts, which

thematically belong to the same subsystem. However, this principle still requires some re-evaluation taking into account the development of computer technologies, as “...new opportunities offered by information technology make it possible to apply new methods to lexicography...” (Veisbergs 2007: 71) and, hence, terminography.

Today the process of compilation of modern scientific and/or technical dictionaries is dependent on the progress in the new technologies – computer linguistics, creation of the artificial intelligence, machine translation, compiling of terminology data bases and LSP online dictionaries.

The mechanisms of meaning extraction have facilitated the work of terminologists/linguists/scientists/experts/translators, enabling them to find the necessary information about related terms and concepts (cross-referencing), to substitute one term with another sharing the same or similar characteristics (auto-synonymy), to use a more general or more special term (BT and NT relations).

The third principle states that the terminological concepts should be easily distinguished as terminological definitions. The traditional schools of terminology consider that terms should represent such definitions of concepts, which can be easily implemented into the concept system. Although the terminologists of the Austrian school outlined that such a definition could be of three types: intensional, extensional and part-whole, they still preferred the intensional definition. ***Modern terms usually are not defined in the traditional way.*** They can be either explained (semantic aspect) or provided with context for additional information and better understanding (pragmatic aspect). Modern terms can be accompanied with visual aids, i.e. pictures, sketches, drafts, schemes or symbols (semiotic aspect), a phenomenon, which is especially characteristic of the domain under discussion. Contemporary dictionaries, although based on the traditional principles, are structured taking into account the above mentioned aspects as well as the fact, that terminology users approach terminology in three ways:

- *linguistically* (meaning formation patterns, text linguistics, grammatical structures, linguistic contexts, correct application);
- *cognitively* (delineating logical sequences, establishing clear relations, processing the concept, thinking of the shades of meaning, which appear when terms are specified by the adjectives or adverbs);
- *with respect to communication* (in native or foreign languages, looking for precise translation equivalents and/or analogous terms).

Methods and models of terminology analysis have been developed taking into consideration the main aspect of research, as well as the professional competences of the researcher. The application of computer in the terminology analysis opens new perspectives through the introduction of numerous language processing software programmes (e.g., D. Bourigaul, C. Jaquemin, M.-C. L'Homme, 2001).

The increasing role of the social factors in all spheres of human activities demands a wide use of sociological methods in terminology investigation (Y. Gambier, 1991; F. Gaudin 1993; Boulanger, 1995). Cognitive and even socio-cognitive aspects of communication also call for the introduction of the corresponding methodology (R. W. Langacker, 1993, R. Temmerman, 2000).

Scientists, who prefer to analyse terms from the linguistic perspective concentrate on research of terms in the particular linguistic context, i.e. they base their suggestions on corpus linguistics (L' Homme, 1999/2001), investigating the nature of the text, term implementation in the sentence/utterance/text (D. Bourigaul, 2001; M. Slodzian, 1999), and concentrate on a correct application of terms.

J. Sager (1990: 13) stresses that “...*a communicative aspect, which looks at the use of terminologies and has to justify the human activity of terminology compilation and processing...*” is of primary importance today. The communicative aspect has also

been analysed by T. Cabre (1999), who investigates the communicative dimensions of terms in addition to their linguistic aspects.

The communicative aspect is one of the most important in the terminology creation process, as, according to J. Sager

“...term formation is a conscious human activity and differs from the arbitrariness of general word formation processes by its greater awareness of pre-existing patterns and models and of its social responsibility for facilitating communication and the transmission of knowledge” (Sager, 1997: 25).

T. Cabre (1999: 114) also stresses that *“...experts in a given domain can use the specialised terminology in a variety of communicative acts and at several different levels of abstraction, thus blurring the classic, well-defined view of what terminology is...”*.

The representatives of the traditional schools emphasized as the fourth principle, *that one term should be assigned only to one concept as an absolute standard. Terms are supposed to be monosemous.* This assumption is still valid, however, only in the frame of one scientific field. Today the process of novel term formation is more complicated by the necessity to consider the role of the context. The analysis of context is absolutely essential in the field of terminology, as context *“...makes it possible to determine the specific relationships between a term and its subject field through concept identification..”* (Dubuc, Lauriston, 1997: 81). It can be explained by the fact that ***language resources are quite limited in comparison with the dynamic processes of new term development.*** New terms are likely to be coined by meaning formation patterns, borrowed from other languages or created as a result of meaning shifts of the already existing lexical items. Therefore, terms are *“... not separated from the rest of the vocabulary, and it is rather hard to say where the line should be drawn...”* (Arnold, 1986:232). According to J. Šilis (2009: 202) there is *“...the tendency of influx of more and more LSP lexical units into common*

vocabulary...”. Moreover, in the course of the years a variety of special notions “...*have become known to the layman and form part and parcel of everyday speech...*” (Arnold, 1986:232). This factor may lead to the confusion, which “...*is caused by the interference among general language words and specific purpose terminology, as for example, “harmful” and “toxic” in the fields as waste management...*” (Ločmele 2006: 95). There are also many lexical items, which belong to the general language, but simultaneously bear a special meaning in the respective scientific technical field, e.g.: *plate, belt, chain, table*, etc.

The extensive application of meaning formation patterns for creation of new terms required re-evaluation of the nature of a concept. This phenomenon has been critically investigated by T. Cabre (1995, 1999, 2000) and R. Temmerman (1998, 2000). They argue that “...*some terminological phenomena can be better described by using more flexible and powerful structures of concepts such as prototype theory...*” (Kageura, 2002: 20). They also emphasize the needs for more flexible approach to concept analysis, stressing the complicated nature of concepts, as they do not have “...*rigidly set borders...*” (Cabre, 1999: 43), but just “...*artificially defined limits...*” (ibid) set for the purpose of their standardization.

Representatives of the traditional schools considered *that one concept should only be named by one term*. Modern terminology researchers do not perceive terms as “...*systematic and deliberate creations reflecting the systematic nature of concepts...*” (Kageura, 2002: 21), they “...*apply a more flexible framework of concepts to the description of terminological phenomena...*” (ibid) in comparison with the representatives of the traditional schools of terminology.

At present a complicated phenomenon typical of the terms in the environment-related fields, such as the ***existence of intra-field synonymy*** (application of synonyms, doublets and variants), does not cause misunderstanding of concepts by the experts of the respective fields, but makes application of these terms difficult for the experts of other fields or laymen. Terms in the environment-related fields could possess even

three or four synonyms/doublets/variants, which can be distinguished when used in a text. Extensive application of many synonyms/doublets/variants is especially typical of the dynamically developing terminology, when the process of terminology categorisation is already finished, but a search for a preferred term is still in progress. The choice of a term is then determined by its precision and the frequency of its application. The analysis of terminology in use is one of the topical themes in modern terminology research. T. Cabre (1999: 121) states that “...*terms are pragmatic units of communication and reference and, as such, have certain discourse characteristics and occur in well-defined communicative situations*”.

In the fifth principle of the traditional schools of terminology the synchronic perspective of terminology analysis was considered. It means that traditional terminologists were not concerned with language evolution, because they focused on the contemporary development of the particular concept system. Today when analysing terms in use, experts implicitly or explicitly also pay attention to the diachronic perspective of terminology analysis. According to R. Kosellek (1979) “...*the comparative historical reconstruction of concepts and terms in form of a diachronic conceptual analysis...*” is absolutely crucial. G. Budin (2001) holds the similar opinion emphasizing that “...*such a historical study of terminology should be combined with synchronous and interlingual analyses*”. Linguists pay attention to the diachronic perspective of terminology analysis, as when investigating a particular term, they study its etymology, in order to trace how its meaning and, possibly, its form, have changed over time and how these changes influence the meaning of the term and its application now. At the same time, the synchronic approach “...*demands a study not of individual words but of semantic structures typical of the language studied, and of its general semantic system...*” (Arnold, 1986:37). Although for the needs of the contrastive analysis terms are studied from the descriptive synchronic perspective, in order to better comprehend the mechanisms of term formation in the particular thematic field, it is absolutely crucial to make a comparative analysis as well, adopting a diachronic approach to terminology, which reveals the changes (in meaning, form and application) of a particular term.

The representatives of the traditional schools of terminology also emphasized the need for a term to be as short as possible to facilitate communication between the experts in the respective scientific and technical fields. This assumption was not formulated as one of the basic principles of terminology; although it is one of the decisive characteristic features of an ideal term. However, there is a contradiction between the necessity of a term to be short and the precision of its meaning in a communicative setting. It is typical of the modern terminology, especially in the young scientific disciplines, to create terms, which would contain as many characteristics as possible to avoid any misunderstanding and, thus, produce terms, which are context-independent. Therefore, on the one hand, the tendency to link different meanings or different shades of meanings, results in *the production of multi-component terms*. On the other hand, there is a *global tendency for compression of information*, which results in the production of many lexical variants, acronyms and abbreviations, as well as integration of special symbols into the process of term formation.

Except for the conciseness of the form an ideal term should be coined taking into account such factors as fast integration into the term (and concept) system, good euphony, modernity and easy international application. The integration of a term is dependent on the frequency of its application, its semantic preciseness and speech facility. It is a time-consuming process, which is regulated by the language development, scientific progress and intensiveness of communication at the international level. Scientific and technical terms should not evoke negative connotations within a particular scientific field. Entry terms should also be modern and their form should reflect the development tendencies of a particular language. This is especially important for environment-related fields, as environment pollution and protection are global issues and require constant information transmission at the international level. According to V. Skujina (2001: 253) the multilingual view of a term and its concept analysis allows us to make sure about the international term choice justification, and also about the correspondence of internationalisms to their internationally unambiguous term function.

It should be taken into consideration that the contemporary scientific and technical terms hardly correspond to all principles stated above. Modern terms should ideally correspond to such characteristic features as monosemy within one field, preciseness of the scientific concept it denotes and compliance with the norms and rules of a particular language, while all other factors should be considered secondary, altering and situation-dependent.

Therefore, it is essential to formulate the basic characteristic features for the description, systematization and analysis of terminology in the environment-related fields, which could act as the main principles, governing terminology research today. Modern terminology is:

- often created to name an emerging scientific phenomenon, before a well-formulated scientific concept appears – *the semasiological approach to terminology*;
- either explained (the semantic aspect) or provided with a context for additional information and better understanding (the pragmatic aspect), or is accompanied with visual aids (the semiotic aspect) – *representation of special meaning for the needs of communication*;
- monosemous only in the frame of one scientific field – *adoption of artificial limits for the purpose of terminology unification, harmonization and standardization*;
- studied from the diachronic perspective – *development of a particular term, etymological approach as a means for better comprehension of the contemporary meaning*.
- term application is influenced by the progress in the new technologies – computer linguistics, creation of the artificial intelligence, machine translation, compiling of terminology data bases and LSP online dictionaries, i.e. *organization of special knowledge and mechanisms of*

special meaning extraction (tags and markers, cross-referencing, access to information in the concept system, etc.).

The basic modern terminology principles stated above are the main theoretical findings of the research. They were formulated as a result of the analysis of the empirical material of the field under discussion. These principles reflect the contemporary tendencies in terminology development and have a universal character (i.e. to a certain extent suitable for all scientific technical domains).

1.8. Summary

Terminology, as a scientific discipline, started to develop dynamically in the first half of the 20th century, when experts acknowledged the necessity to define, classify and study the relevant principles, which could help them perform terminology analysis, as well as identify the main method and approaches, suitable to deal with the variety of terms. The status of this scientific discipline is still being disputed, however, it cannot be ignored that terminology has its own theoretical background and clear empirical purposes (compiling vocabularies, glossaries, dictionaries, data banks).

The representatives of the traditional schools of terminology have formulated five basic principles of term creation and application. They have claimed that:

- a term should denote just one concept;
- a term should be studied from the onomasiological perspective;
- both terms and concepts should be investigated synchronically;
- the concepts should be formulated clearly;
- the concepts should take a certain place in the concept system.

The last item is very important for the establishment of the links between a concept and the entry term in the system, which is very significant for the purposes of technical communication, contrastive analysis and, hence, translation.

As the amount of scientific technical information is rapidly increasing, the organization of special knowledge has changed. Today the processes of term formation involve not only linguists and/or terminologists, but also IT specialists, as the great number of different contemporary software programs designed for the processing of information facilitate classification, collection and application of terms. It results in elaboration of new mechanisms for the identification, retrieval and processing of a great number of newly created terms. The scientists have recognized that the traditional theory of terminology has a variety of restrictions, which should be re-evaluated, as to the process of term formation and its implementation in the text.

The author puts forward the following basic principles relevant for the description, systematization and analysis of modern terminology:

- contemporary terms should be considered by adopting the semasiological approach;
- modern terms should be studied diachronically;
- modern terms should be monosemous only in the frame of one scientific field;
- the terms can be defined in a variety of ways, e.g. explained, provided with a context for additional information, or they can be accompanied with visual aids;
- the application of the terms is influenced by the progress in the new technologies.

The principles stated above were formulated as the relevant theoretical findings of the research in the process of the analysis of terminology of the thematic field

“environment and ecology”. The development of terminology of the present field most brightly demonstrates the modern trends in the process of novel terms creation.

The choice of the terminology of environment and ecology as the subject for the research is also justified by the necessity to study, analyse and classify terms belonging to this particular field. For the needs of the present research the author provides the following classification of the lexical items, which belong to the present thematic field:

- Terms of scientific and technical discourse;
- Terms of scientific and technical domain;
- Words of general language used as terms;
- Words of general language.

The terms belonging to these groups can be analysed, taking into account different aspects, e.g. the term formation patterns, structural representation, role, position and function of a term in the particular texts. Terminology of the field under discussion is studied within the frames of a large number of subdisciplines of linguistics (semantics, pragmatics and semiotics).

The choice of the terminology of environment and ecology as the subject for the research is also caused by the importance of this domain for the existence of any community in the world. The analysis of the terms of the thematic field “environment and ecology” can help experts investigate in what way the terms of the same scientific technical domain are organized in various languages (in this research: English and Latvian) and, thus, study different aspects of multilingual interaction among various communities.

2. Text Analysis: Theory and Methodology

2.1. Text Typology

The purpose of the text and its function are determined by the type of a text. However, the notion ‘*text type*’ is of manifold nature and requires some consideration as well. There is polysemy hidden in the concept of a text.

Moreover, the notion of text might differ, depending on the linguistic and extra-linguistic characteristic features of a particular language, or as defined by K. Reiss (1971: 69) on the “...*intra-linguistic criteria (semantic, lexical, grammatical and stylistic features) and extra-linguistic criteria (situation, subject field, time, place, sender, receiver and ‘affective implications’ (humour, irony, emotions)*¹¹...”. The combinations of these features demand application of various approaches to text analysis, which should be taken into consideration:

- the ***initial aim of a researcher***: to discover the meanings in the text, to map material shapes of meaningful units, to study the effects they produce on the whole text and on the target readership, etc.;
- the ***communicative setting***: monolingual, multilingual/intercultural (contrastive analysis, translation);
- the ***type of the text***: the communicative function of the text (the purpose of the text), what functions does the text have and how these functions are encoded in the surface structure of the text (i.e. which linguistic forms are used for which communicative functions)? (cf. C. Gnutzmann, H. Oldenburg, 1991: 106);
- the ***genre of the text***: the conventionalised form of a text important to perform a certain function, the generic conventions in creating new texts;

¹¹ In Munday, Jeremy (2001) *Introducing Translation Studies: Theories and Applications*. London: Routledge.

- **register analysis**: the situation in which the text occur, individual style of the author of the text, a variety of stylistic features applied.

The detailed research of a textual environment, taking into account all the above mentioned aspects, is a starting point for a deep lexical/terminological analysis and the basic foundation of the contrastive studies. However, at the beginning of the research the function of the text, i.e. its purpose should be defined. This view is supported by K. Reiss and H.J. Vermeer (1984), who have elaborated the Skopos theory, following which the purpose of a text is considered above all other criteria, and by knowing the purpose one (linguist/expert/terminologist/translator) can proceed with the further analysis of the text.

According to C. Nord (2005: 20), German linguists and translatology specialists (Reiss 1976, Reiss and Vermeer 1984) usually distinguish between *text type* and *text class*. The text type is functional classification (e.g. informative vs. expressive vs. persuasive texts or descriptive vs. narrative vs. argumentative texts), and text class is a category that refers to the occurrence of texts in standard situations (e.g. weather report, prayer, folk-ballad, operating instruction).

English speaking linguists tend to use the term text type for both classifications (de Beaugrande 1980, de Beaugrande and Dressler 1981, House 1997). For the needs of the present research the author shall accept the definition of a text type proposed by R. de Beaugrande (1980: 197), who states that “...a text type is a distinctive configuration of relational dominances obtaining between or among elements of (1) the surface text; (2) the textual world; (3) stored knowledge patterns; and (4) a situation of occurrence...”. It means that a certain text type is presented in a particular linguistic form, it is designed to fulfil certain functions and has embedded information on stylistic requirements, as well as possible generic conventions. Depending on the text typology, the requirements for the particular type of the text may vary according to the theories of different linguists.

One of the first text typologies has been proposed by the eminent German scholar Karl Bühler (1934/1965), who provided a division of texts, dividing them into three main groups, according to the function of the linguistic sign: 1) *informative or content-oriented*; 2) *vocative or reader-oriented*; 3) *expressive or author-oriented*.

E. Coseriu (1970) observes the above mentioned three functions of the linguistic sign in terms of their relative dominance in linguistic utterances, and, thus, distinguishes three language forms:

“...a descriptive, declarative or informative language form, the main object of which is providing information about a given topic; an expressive or affective or emotive form, mainly expressing the speaker’s state of mind or feeling; and a vocative or imperative form which primarily seeks to bring out certain behaviour in the hearer...” (Coseriu 1970:27 in Hatim and Munday 2004:183).

By this classification E. Coseriu identifies the centre of each type of the communication, i.e. *sender, receiver, topic*.

K. Reiss borrows K. Bühler’s (1934/1965) three-way categorisation of the functions of language, *“...linking the three functions to their corresponding language dimensions and to the text types or communicative situations in which they are used...”* (in Munday, 2001: 73). K. Reiss provides a translation-driven typology of the texts, considering the following text types:

*“**Informative texts:** Plain communication of facts (news, knowledge, information, arguments, opinions, feelings, judgements, intentions, etc.,) where the topic is in the foreground of the communicative intention. This includes phatic communication, the actual information value of which is zero, and the message is the communication process itself.*

***Expressive texts:** Creative composition, an artistic shaping of the context. The sender is in the foreground. The text is doubly structured: first on the syntactic-semantic level, and on the level of artistic organisation. In addition to this linguistic function, an expressive text must also fulfil an artistic function.*

Operative texts: *The form of verbalisation is mainly determined by the addressed receiver of the text. The text is doubly or triply structured: on the semantic-structural level, on the level of persuasion, and sometimes but not necessarily, on the level of artistic organisation. An operative text must fulfil both a linguistic and a psychological function.*” (Reiss, 1976: 97-100)¹².

Taking into account the text typology proposed by K. Reiss (1976), E. Coseriu (1970) and the types of text formulated by K. Bühler (1934/ 1965), and analysed by I. Zauberga (2004, 16-22), the author of the research provides the following analysis of the text types.

Table 1

Text Typology: Various Classifications

Type of Text	K. Bühler’s Classification	K. Reiss’s Classification	I. Zauberga’s Classification	E. Coseriu Classification	Comments
Informative texts	<ul style="list-style-type: none"> - information is passed concisely and lucidly; - emphasis lies on the content items; - texts contain straightforward messages and are free from connotations, emotive language, sound-effects and original metaphor; 	<ul style="list-style-type: none"> - the dominant form of language is functional language; - the text is structured primarily on the semantic-syntactic level. 	<p>According to the classification proposed by I. Zauberga, this kind of texts are considered to be completely content-oriented</p>	<ul style="list-style-type: none"> - a text is designed to provide information in a descriptive, declarative language form; - E. Coseriu considers this type of text to be topic-centred 	<ul style="list-style-type: none"> - these texts abound in specific terminology, which should be relatively easy to standardize; - the main function of the text is the transfer of information; - the text rarely contains figures of speech; - emphasis is on the content, however, it should be represented within the frame of the given structure;

¹² In Hatim, Basil and Munday, Jeremy (2004) *Translation: An Advanced Resource Book*. Abingdon: Routledge.

Expressive texts	<ul style="list-style-type: none"> - conveying peculiarities of the author's poetic world as a rule is one of the major functions; - the translator is expected to transfer not only the message of the ST but also the specific way the message is expressed in the ST. 	<ul style="list-style-type: none"> - the author consciously exploits the expressive and associative possibilities of the language in order to communicate his/her thoughts in an artistic, creative way. - the sender is in the foreground. 	<ul style="list-style-type: none"> - it completely depends on the author, what stylistic devices to use in order to transfer the implied meaning. 	<ul style="list-style-type: none"> - a text expresses individual perceptions of the author, reflects his emotions and feelings; - this type of text is sender-centred. 	<ul style="list-style-type: none"> - there are minimum places in the text when the form of the message, regardless the ways of its transfer could be preserved undistorted. - text contains many tropes (metaphors, metonymy, synecdoche) as well as plenty of colourful epithets.
Vocative/ Operative texts	<ul style="list-style-type: none"> - the main function: manipulative; - the addressee plays a crucial role in the implementation of the intended text function. 	<ul style="list-style-type: none"> - text inducing behavioural responses, as stimuli to action or reaction on the part of the reader. 	<ul style="list-style-type: none"> This type of text is called reader-oriented, as the author of the text applies various vocative features to attract the attention of the reader. 	<ul style="list-style-type: none"> - a text is designed to generate certain reaction and evoke particular associations, which can influence the behaviour of the reader; - this type of a text is receiver-centred. 	<ul style="list-style-type: none"> - texts contain various speech intensification features: graphical (underlining the key concepts, highlighting the main data) and meaning-based (repeating the key terms, paraphrasing one and the same concept)

However, it should be noted, that environment-related texts, studied in the present research as the most illustrative material for the analysis of the tendencies in scientific and technical term creation and application, may belong to all three types of texts, discussed above. These are compound texts, where “...*the three communicative functions (transmission of information, of creatively shaped content and of impulses to*

action) are all present, either in alternative stages or simultaneously...” (Reiss, 1977/1989: 100)¹³.

The primary function of these texts is informative, as they are designed to convey precise information on scientific and technical matters, using special terminology extensively, clichés typical of scientific style, and are structured in the conventional manner. They may also perform an operative function, as in some cases these texts are created to provoke some reaction or feedback from the readership, influence their opinions and views, and even persuade them to act in a definite way. Many environment-related texts are used on posters, brochures, leaflets in order to warn or inform people, prevent ecological disasters, eliminate the consequences of disasters and protect the environment. At the same time, these texts, especially if written in scientific popular style, may contain different expressive means, such as comparisons, metaphors, metonymies, epithets, etc. It means that these texts may be structured not only on the semantic-syntactic level, but also on the level of persuasion and even on the level of the artistic function (cf. Reiss: 98-100)¹⁴. It should be noted that the borderline between informative and other text types in the environment-related field in most cases cannot be strictly drawn.

It is possible to identify the major directions in which environment-related texts are produced, as well as the main characteristic features inherited from these directions for each type of the text (cf. Platonova, 2008a: 35 – 47):

- *Environment protection* – the main problems in the world and community-specific environmental disasters, the effects they produce – the texts are created to attract the attention of the readership, evoke certain images, generate particular behavior;

¹³ In Hatim, Basil and Munday, Jeremy (2004) *Translation: An Advanced Resource Book*. Abingdon: Routledge.

¹⁴ In Hatim, Basil and Munday, Jeremy (2004) *Translation: An Advanced Resource Book*. Abingdon: Routledge.

- *Safety* – information on safety precautions, health protection – texts contain many conventionalized forms, illustrate the tendency to compress information, are characterized by the extensive use of acronyms and abbreviations;
- *Environmental economics* – texts are full of the standardized economic and financial terminology (especially about consumption of the products), used in every environment-related project – a great emphasis is put on statistical data, therefore, the texts contain information expressed in digits/numbers;
- *Environmental technologies* – the standardized list of technical appliances and devices required to analyze, protect and eliminate the consequences of some disasters – texts are structured as handbooks or manuals about the use of technical appliances, i.e. contain short phrases, extensive modality, and are very formal;
- *Environment in the social context* – the means and tools of the governmental institutions and international organizations applied to inform society about the environment-related tasks – texts bear some vocative nature, they contain some stylistic features, which enrich the text and make it vivid and interesting to read;
- *Environmental legislation* – information on laws and regulations – text contain legal language clichés, which are transparent and recognizable in every separate linguistic community.

Every project implemented in the country and designed for environment protection or ecology improvement needs, simultaneously includes terminology, which belongs to all these directions and, thus, to some extent, possesses all characteristics (stylistic restrictions and generic conventions) of those types of texts mentioned above.

As most of the environment-related texts belong simultaneously to many disciplines, they are often created following the standards and principles of text organization characteristic of each particular type of the text, which, sometimes, mutually overlap or contradict. It means that the universal approach to the investigation of the manifold nature of environment-related texts should be applied.

2.2. Standards of Textuality

The universal approach to understanding and explaining the notion of a text may be and even should be based on generalised internationally recognisable principles of text organization, which are valid at least within the frame of a particular scientific and technical domain.

Such principles have been formulated and studied independently by many prominent scholars, e.g. M.A.K. Halliday and R. Hasan (1976), J. Searle (1969), who called them constitutive principles, but the most popular and well-known classification has been produced by R. Beaugrande and W. Dressler (1981), who have defined these principles of organization as standards of textuality. The research they have conducted was mostly limited to the scope of literary texts and they did not focus on the analysis of the multi-dimensional nature of the textual environment of the scientific and technical language.

The standards of textuality are relevant for the present research due to the change of the traditional structure and organization of the scientific technical texts. Under the influence of such factors as globalization, technical boom and rapid development of new technologies and taking into account the increase of the volume of information and, especially, the increase in the number of scientific popular and technical publications, the characteristic features of technical texts have changed (cf. Iljinska, Smirnova 2010: 311 – 338). The changes in the content and structure of the technical texts, in their turn, influence the process of novel term creation, explaining, to some extent, the application of the expressive means (metaphor, metonymy, epithet, etc.). The terms and terminological expressions created following the contemporary patterns are polysemous, context-dependent, based on semantic shifts and/or stylistic devices.

Today these texts can be presented as a multi-level, and even a multi-dimensional structure, as they include not only different hierarchically-bound levels,

but also horizontally-extended dimensions (cf. Platonova 2010: 339 - 359). In the present research the author has grouped all levels and dimensions of the text into the major categories and represented them schematically in the Figure 1.

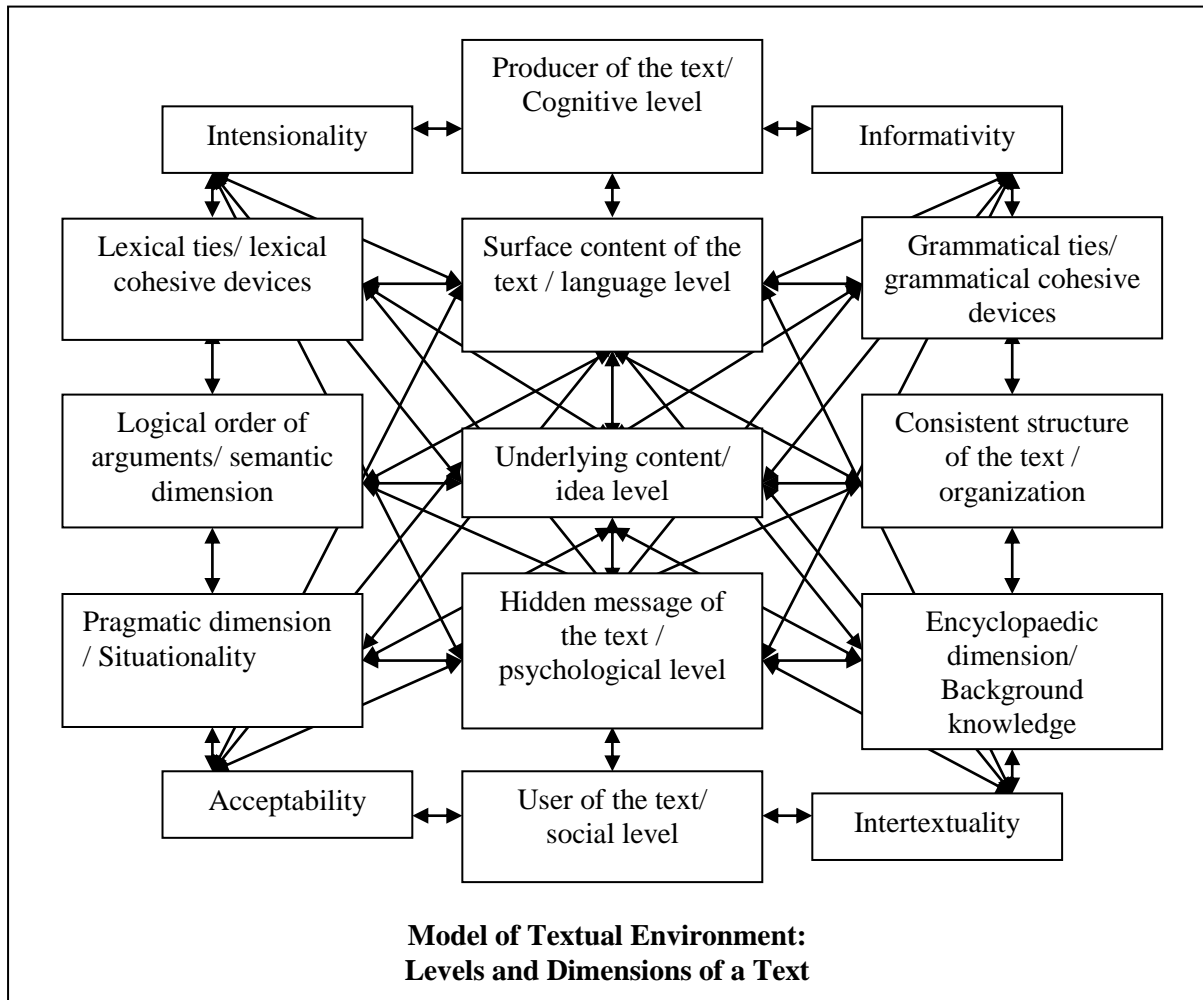


Figure 1. Levels and Dimensions of a Text

The bounds among separate levels and dimensions can be easily identifiable, presupposed or hidden, but, in any case, they should be comprehensible and logical for both the producer and the user of the text.

It means that textuality rests on continuity and connectivity of different components of the textual environment, which are expected to be strongly related in an understandable and unambiguous way.

The complex interdisciplinary nature of the environment-related texts, selected for the present research, requires a thorough analysis of this multi-dimensional textual environment at every level, i.e. *linguistic, cognitive* and *social*.

These levels are formulated and categorised according to the classification of the standards of textuality in terms of their central issue (*text-, producer-, user-centred*).

The text-centered standards are more linguistically based; they consider all levels of the language and observe how the meaning expressed in the surface text is connected with components, which underlie the surface text. The producer-centered standards represent the author's intentions and aims, which are considered when describing a particular process, situation or event.

The user-centered standards are the most controversial in their nature, as they analyze very unpredictable and highly variable phenomena, i.e. user's perception of the information and attitude to that. Translator is also a user of the text, who has individual views and perceptions, and should take into consideration all standards of textuality in order to produce an equivalent target reader friendly translation of the scientific and technical text. According to J. Searle (1969: 33f) these seven standards of textuality function as constitutive principles of textual communication.

Both classifications are produced taking into account the relation of the standards of textuality to translation studies and contrastive analysis (cf. Platonova, 2010: 339 - 359). The levels of textual environment can be further subdivided into the following groups:

- **cognitive (producer-centred)**
 - connectivity of the intentions of the producer and conveyance of information – *intentionality*;
 - connectivity of the content and situation of occurrence – *situationality*;

- connectivity of expectations of the reader and lexical load – *informativity*;
- **social (user-centred)**
 - connectivity of the perceptions of the user and selection of the linguistic means of communication – *acceptability*;
 - connectivity of the background knowledge of the user and information in the text – *intertextuality*.
- **linguistic (content-centred)**
 - connectivity of the underlying content – *coherence*;
 - connectivity on the surface level – *cohesion*.

When analyzing a text one cannot omit any level of textual environment, but it is possible to investigate some levels omitting particular dimensions, which are not concerned with the type of the analysis performed. However, when performing the complete textual analysis of the scientific and technical text, which contains vocative features and expressive means, and belongs to many scientific fields simultaneously, each dimension should be considered.

2.2.1. Producer-Centred Standards of Textuality

2.2.1.1. Intentionality

The notion of intentionality has been studied by many prominent linguists (Austin 1962, de Baugrande and Dressler 1981/1984, Searle 1969/1993, Malmkjær 2002). There are many definitions of the phenomenon, but the author of the present research proposes to adopt the one formulated by K. Malmkjær (2002:548-9), that the intentionality “...concerns the text producer’s intention to produce a cohesive and

coherent text that will attain whatever goal s/he planned that it should attain...". It means that the notion of intentionality is first of all closely related to the linguistic dimensions of textuality, and even the "...goals of intentionality are subordinated under the goals of text production: cohesion and coherence..." (G.D. Vreeland, 2007:361).

It is the primary goal of any textual analysis to discover the intentions of the producer of the text, as this is the key to its comprehension. The author may intend to express various ideas in different ways, e.g. stating the information explicitly or leaving the hints to the hidden information. The latter concerns implicatures and presuppositions encoded in the surface structure of the particular text, which the producer of the text considers to be either obvious to everyone, known to a particular group of people, or understandable just to one user of the text.

The standard of intentionality, alongside with the standards of situationality and informativity, is absolutely crucial for the needs of translatology. The precise information about the intentions of the author of the text is a key to successful translation of the text, which can be achieved employing necessary linguistic means to create the target text (TT) following the generic conventions, register requirements, as well as the individual manner and style of the author of the text.

2.2.1.2. Situationality

The *situationality* of the term is encoded in the text by its author and does not alter. Situationality may be considered as the combination of reciprocally related influential variables, which can be divided into *physical* (Neubert 1992, Darwish 2010) and *mental* (de Beaugrande 1980, Seidlhofer 1995). Physical variables concern *location* (where the situation occur), *time* (when the situation is taking place), *and people* (who are going to participate in the communication). Mental abilities are related to the study of *theme* (thematic restrictions of the communication), *language*

(whether the chosen words fit the context of situation) and *form* (how the information is structured and organized).

Some linguists (Neubert, Shreve 1992: 85) consider that situationality is “...*the location of a text in a discrete sociocultural context in a real time and place...*”, while other linguists (Hatim, Mason 1997:17) suggest that situationality “...*is taken to mean the way text users interact with register variables such as field, mode and tenor...*”. The author of the present research adopts the more general definition of situationality proposed by R. de Beaugrande and W. Dressler (1981: 9), who suppose that “...*situationality concerns the factors which make a text relevant to a situation of occurrence...*” .

The investigation of this standard is especially important for the translational analysis. According to A. Neubert and G.M. Shreve (1992:85) situationality is the central issue in translatability. For the needs of the contrastive analysis and translational investigation some additional variables can be added, e.g. *linguistic affinity* (the level of proximity between languages) and *purpose* (the main aim of the contrastive analysis or translation).

It should be noted that if the translator, to some extent, can substitute the term with another, in his opinion, more acceptable target term, then s/he cannot vary the situation in which the particular term is positioned. In other words the translator can influence the choice of words following the term-concept assignment, which should match the information requirements of the text in the target language (TL). However, a translator cannot change the information, i.e. content of the source text (ST), in the preferable way. Situationality and its link with the terms elaborated in the text can vary only at the source level, i.e. in the real authentic texts, where the term is used for real communication.

2.2.1.3. Informativity

The notion of *informativity* concerns the extent to which a communicative occurrence might be expected or unexpected, known or unknown, certain or uncertain (de Beaugrande, Dressler, 1981:8-9). Informativity varies across the recipients of the information stated in the text. It can be analyzed at an *abstract/general* level (what an every educated person should know), at *subject/theme* level (what special knowledge people should possess in the particular context of situation) and at *individual* level (what a particular person knows or does not know concerning the theme under discussion).

The application of various language resources influences our perception of the information expressed in the text, confirming or denying our expectations of a text type, genre and style. E. Nida (1964/1969) was one of the first translatology theoreticians to discuss the notion of style in terms of stylistic unexpectedness, as one of the informativity-sensitive factors. This is especially important in the situations when the sender of the information uses terms belonging to different registers, thus, challenging the expectations of the receiver. According to B. Hatim and I. Mason (1997:95) “...*highly informative utterances would be maximally unexpected and optimally dynamic, a processing complexity which nevertheless soon pays off since the more informative the utterance is, the more interesting it will be...*”.

The use of terminology demands from the recipients to possess a higher degree of informativity at any level, especially when these terms are coined based on the meaning formation patterns. Environment-related texts contain terminological units (single words or multiword phrases that function as terms), which generally possess a very high level of *informativity*.

The scope of significance and relevance of individual information units depend on the type of text and the nature of information communicated. In most cases terms are used according to their degree of precision and information level, which determines all their meanings (primary, secondary, shades of meanings), but it is

context which helps the user choose the precise and acceptable equivalent. It is especially significant for the situations, when words of general language act as terms, for instance:

Table 2

Examples of Terms with High Degree of Informativity

Term in English	Description	Term in Latvian
“do-nothing” alternative	alternative actions taken by the project management	“Nulles” alternatīva
“do-minimum” alternative		minimālā (darbības) alternatīva
“do-maximum” alternative		maksimuma alternatīva
Tragedy of the commons	An economic problem in which every individual tries to reap the greatest benefit from a given resource.	“Ganību tragēdija”

These terms have no set direct equivalents in the Latvian language. Therefore the translators use the literal approach, choosing the appropriate stylistic devices and linguistic means, in order to express the exact meaning of these terms in the target language and achieve the necessary degree of informativity. Moreover, informativity of these lexical units can be realised only within a particular context, as their position in the text influences the information the text conveys. The context in its turn determines the relevance of an individual lexical unit for the communication of this information.

These various degrees of informativity must be taken into consideration performing a contrastive analysis or translation. It will help decoding how different terms used in the source text (and, sometimes, absent in the target culture) are transmitted into the TL. A translator then has to decide what constituents of the entry term in the source language could be sacrificed and how some of them could be compensated applying the linguistic means of the target language, in order to create the same degree of informativity at the particular level for the target readers.

2.2.2. User-Centred Standards of Textuality

2.2.2.1. Acceptability

The standard of acceptability is the defining characteristics of the text, which confirms or defies whether the text is cohesive, coherent and meets the requirements of the user, as well as his/her expectations. In other words the standard of acceptability “...is measured by the reader of the text who must decide if the text is cohesive, coherent, and if it fulfils the communicator’s intentions...” (T.Rata 2007:6). This standard indicates to what extent the user of the text is tolerant (cf. Enkvist 1978) to the way how the intentions of the author of the particular text are formulated, structured, organized and implemented. The expectations of the receiver concern the type of the particular text (also style and genre), socio-cultural dimensions of the communication act, and the choice of words/terms, used in the text to express the ideas of its author.

The acceptability of the text is even more complicated by the fact that the term may simultaneously belong to many scientific and technical domains, i.e. share many semantic features. It means that the acceptability of the term is a highly variable phenomenon, which depends on the placement of the term in the text, its surrounding context, i.e. pragmatic aspect.

It is easier to determine the acceptability of a term, which is more frequently used, than of a term, which has a low rate of frequency or is an obsolete one. It happens because topicality and frequency of application influence the process of compiling both printed and electronic glossaries and dictionaries, which normally include an entry term with its primary meaning or meaning relevant to the respective field of studies. This again facilitates the choice of terms and decreases the risk of selecting the less acceptable terms.

However the acceptability of the term is still based on the individual perception of the reader, i.e. it cannot be predicted for sure that every reader will find the term

acceptable. It means that the selection of lexical elements for the surface text should be carefully planned.

2.2.2.2. Intertextuality

The standard of *intertextuality* acts as the major factor determining the type of the text. Some authors, for example R. Bell consider that standard of intertextuality refers to "*...the relationship between a particular text and other texts which share characteristics with it; the factors which allow text-processors to recognize, in a new text, features of other texts they have encountered...*" (Bell, 1991:170-171).

According to Fairclough (1992: 118-123) there exist two types of intertextuality: horizontal and vertical. Horizontal intertextuality "*...involves concrete reference to, or straight quotation from, other texts...*" (Hatim & Munday, 2004: 87). While vertical intertextuality "*...represents an 'echo' effect involving reference, not to chapter and quotes, but to an entire mode of expression (style, genre, tone)...*" (ibid). It means that texts can be connected to other texts in many ways, ranging from the most direct and obvious reference and even quoting to the most indirect and hidden association or allusion (cf. Johnstone, 2008: 164).

Many environment-related texts contain terms which belong simultaneously to different scientific and technical domains. This factor calls for a more comprehensive definition of intertextuality. The French scholar J. Kristeva (1986) suggests that the term intertextuality denotes the ways in which texts and ways of talking refer to and build on other texts and discourses. Thus, the notion of **interdiscursivity** should be introduced in order to examine the phenomenon.

Interdiscursivity can be defined as "*...reciprocal interaction and influence of contiguous and homologous discourses...*" (Angenot, 1983: 107). In other words, it is the "*...interaction of the fundamental regulative principles of special discourses...*" (Bruce: 1994, 47-76).

Within the environment-related field the necessity to consider the standard of interdiscursivity is also justified by the presence of numerous abbreviated forms. They are used in the identical way to denote distinct meanings in the parallel discourses and it should be noted that such types of abbreviations do not vary across the languages, e.g.:

Table 3

Abbreviated Terms Used in Several Scientific Technical Fields

Abbreviation	Meaning	Abbreviation	Meaning
a	Air, age, area	ai	Active ingredient, after inspection
ag	Advisory group, agriculture	c	Capacity, central, changes, channel, class, course, coefficient, container, cycle
C	Calorie, centigrade, centre	cond	Condition, conduit
cont	Content, control	cp	Calorific power, constant pressure
d	Deformation, degree, dominant	D	Dam, density, dose
del	Delay, delivery	dig	Digest, digging
e	Earth, energy, erosion, error	ex	Examined, example, exceptioin
f	Family, fission, foot, frequency	F	Factor, female, filter, fluid
g	Gley, green, group, gravity	H	Hail, hardness, hot, house, humidity
ht	Heat, height	hv	Heavy, high-velocity
inv	Inverse, investigation	l	Length, level, litter, load
L	Land, low	lf	Leaf, load factor
m	Mark, male, measure, meter	M	Maintenance, mean, medicine, membrane, mixture, movement
NE	Net energy, no effect	NI	Neutralization index, noisiness index, not important
o	Occasional occurrence, organic horizon, origin	p	Peak, part, power, pressure
P	Parent, pattern,	r	Rain, river, road

	period, plague, provisional		
R	Rate, ratio, reaction, resistance, Roentgen	reg	Regeneration, region, register, regulator
res	Research, reserve, resistance, residue	s	Secondary, section, sign
S	Service, sire, solid, solubility, species, standard, stock, survey	T	Table, tank, temperature, tension, test, trace, transport
U	Underground, uniform, unit, unserviceable	V	Variation, velocity, vibrio, volume
w	Water, weather, wrong	wt	Waterlight, weight

Thus, all types of environment-related texts rely heavily on intertextuality. The higher is the degree of intertextuality and interdiscursivity demanded, the more terminologically complicated the texts are.

2.2.3. Content-Centred Standards of Textuality

Generally, understanding of the text is based on the comprehension of its coherence and cohesion, taking into consideration other levels of textual environment. The number of the horizontally-extended dimensions depends not only on the type of analysis, depth of the research, its purpose and practical use, but also on the type of a text, its style, genre and discourse, and thus can be very limited, or, vice versa, enormously extended.

The notion of cohesion is always connected to the notion of coherence, and they are considered to be mutually complementing, however, it is still possible to analyze a text omitting one or the other. Thus, a clear identification of both notions is required. According to U.M. Connor (1996) cohesion concerns all the ways in which the

components of the text are mutually interrelated. Cohesion could be the most useful constituent of discourse analysis or text linguistics applicable to translation. It is determined by lexical and grammatical overt intersentential relationships, while coherence is primarily based on semantic relationships.

It means that coherence shows connectivity of underlying content, while cohesion represents connectivity of the units of syntax and between them on the surface level. R. Beaugrande and W. Dressler (1981) support this assumption:

„The major units of syntax found in the natural language text are patterns of well marked dependencies: the PHRASE (a head with at least one dependent element), the CLAUSE (a unit with at least one noun or noun-phrase and an agreeing verb or verb-phrase), and the SENTENCE (a bounded unit with at least one noun-dependent clause)” (Beaugrande and Dressler, 1981, 49).

These units can be better processed in a rather limited, well-defined period of time, especially when contrasting several languages. In a prolonged, although precisely defined period, it is possible to analyse not only how these units or structures are used today, but also how they have been used in different intervals of time (cf. De Beaugrande, Dressler 1980; Halliday and Hasan 1976). It helps us conclude what kinds of modifications, semantic shifts or any other grammatical changes have taken place and how they have influenced the meaning and application of the definite structure today.

For the analysis of the terminology which appears in the text, it is relevant to consider all standards of textuality, but still the content-centred standards demand a thorough research.

2.2.3.1. Coherence

Many prominent linguists (de Beaugrande & Dressler 1981:3; Brown & Yule 1983: 195; Ellis 1992: 148; Enkvist 1978) consider that without coherence, a set of sentences would not form a text, no matter how many cohesive links there were between the sentences (S-K. Tanskanen 2006: 16). It means that despite the fact that the coherence of a text can be achieved through the application of cohesive links, the presence of these cohesive links is not itself the guarantee for coherence. For the text to be coherent, it should present a continuity of senses in the mind of the reader, i.e. the reader links the elements of the text logically and, even, psychologically, as “...*it is psychologically impossible to see or hear two words juxtaposed without straining to give them some measure of coherent significance...*” (E. Sapir, 1921, 1939, 2007: 58).

Therefore, it is possible to conclude that coherence reflects the relations among elements of the text, “...*whether grammatical, semantic or contextual, that hold a text together so that it makes sense...*” (M.A.K. Halliday, R. Hasan, 1976).

Coherence can be studied at various levels of the text, thus according to Fredriksen (1977, in S. – K. Tanskanen 2006: 28), it is possible to differentiate three types of coherence:

- *Functional or propositional coherence* (generating a set of to-be-communicated propositions and illocutionary functions which are contextually appropriate);
- *Thematic coherence* (staging a message by sequencing, topicalization and marking information as old (given) or new);
- *Within-sentence coherence* (generating sentences that express message information and are appropriate in a communicative situation).

The similarities between this view and the standards of textuality elaborated by R. Beaugrande and W. Dressler (1981), can be easily identified. Generally the user- and producer-centred standards of textuality are formulated to define and analyze the

author's and reader's perceptions of what a coherent and cohesive text is and what are the communicative situations, and where this text is going to be appropriate and understandable.

2.2.3.2. Cohesion

The cohesion influences the structure and organization of the text at the linguistic and non-linguistic levels (the interpretation of the text). Cohesion within a phrase, clause or sentence is more direct and obvious than cohesion among two or more such units. This assumption is supported by R. de Beaugrande and W. Dressler:

“In closely-knit units, such as phrases, clauses and sentences, cohesion is upheld by fitting elements into short-range grammatical dependencies. In long-range stretches of text, the major operation is discovering how already used elements and patterns can be re-used, modified or compacted” (Beaugrande and Dressler, 1981, 54).

In order to fulfil this major operation there exist special cohesive devices, which contribute to better understanding of the text, wise editing and economy of space. This is extremely important for the environment-related texts, where in most of the situations information should be communicated in a very concise form, which, nevertheless, has a huge semantic load.

These devices are used for deletions and omissions, full and/or partial repetitions, complete and/or partial substitutions, and can be split into two categories of cohesion: *lexical* and *grammatical* (first formulated by Halliday and Hasan in their groundwork “*Cohesion in English*” in 1976), but there is still no clear classification of the cohesive devices into categories. It can be explained by the fact, that different scholars have formulated these devices differently.

For instance M.A.K. Halliday and R. Hasan (1976) considered that *grammatical cohesion* includes substitution, ellipsis, conjunction and reference, while *lexical cohesion* contains reiteration and collocation.

R. Beaugrande and W. Dressler (1981) extended the notions of repetition and synonymy included into reiteration, into separate categories: recurrence, partial recurrence, parallelism and paraphrase. On the other hand, they omitted other lexical relations (antonymy, metonymy, hyponymy). They also adopted other terms to denote the same cohesive device: pro-forms for substitutions, thus shrinking the notion; and junctions for conjunctions, thus extending the term.

The author of the research agrees to the extended approach proposed by R. Beaugrande and W. Dressler, but considers that the lexical relations, as well as collocation, which they have omitted, should also be included into research. According to the aim of the present research cohesive devices have been selected and grouped in the following way (cf. Platonova 2008b: 139-152):

- **Lexical cohesion**

- *Recurrence* (repetition of lexical units in the text);
- *Partial recurrence* (partial repetition of the lexical units in the text);
- *Parallelism* (emphasizing information in the text, repeating it and expressing it in other words);
- *Paraphrase* and *Synonymy* (expressing the meaning of a unit of syntax by other lexical elements);
- *Reiteration* (repetition, hyponymy, metonymy, antonymy);
- *Collocation* (pairs of associative lexico-semantic relations).

- **Grammatical cohesion**

- *Pro-forms* (substitutions with constructions, which do not have a personal lexical load);
- *Ellipsis* (omission of surface elements);

- *Use of tenses* (use of verb tenses);
- *Junctions* (conjunctions, disjunctions, contrajunctions, subordinatives).

The author of the research tends to analyse cohesive devices, illustrating them with practical examples, selected from annual reports, public campaign promotional materials and other types of environment-related texts.

■ Lexical Cohesion

Lexical cohesion deals with connections based on the word level. It involves the process of choosing appropriate lexical items, which in some way are related to the lexical items used earlier in the text (cf Halliday and Hasan 1976). It means that lexical cohesion will vary from genre to genre and from style to style, since it involves the choice of precisely suitable words and expressions. Generally, lexical cohesion always requires reference (direct or indirect) to the text, or more precisely to the particular element of the text, which should be interpreted correctly (cf. Beaugrande 1980). It contributes to the acceptability and intertextuality of the text, as provides detailed information on the particular issue and makes it recognisable in other contexts.

● Recurrence and Partial Recurrence

Recurrence can take place on different lexical levels, such as sentence/ utterance/ text. Recurrence, as a cohesive device, is usually used to reflect the core message of the text. In the environment-related texts, both informal informative materials and formal special documents, careful application of recurrence is considered to be significant, since these texts are aimed at attracting the attention of the audience to the issues or problems, which are equally important to human beings, irrespective of their social status, standard of living, age or gender. For example:

This year again "Vides projekti" Ltd. took up the campaign against old grass burning and supported the fight of the responsible institutions from the

Ministry of Interior against reckless activity of people - burning the old grass and causing damaging consequences¹⁵.

In this example the key term – *old grass burning* – has been repeated twice, at the beginning and at the end of the sentence, in order to stress the importance of the question under discussion.

If recurrence becomes unduly frequent it can only harm, as it lowers both the informativity of the text and the acceptability of it by the readers; makes it difficult to read and heavy to comprehend. In the translation of this passage into Latvian partial recurrence is used, which helps one to avoid such cases.

Valsts SIA "Vides projekti" turpina iepriekšējos gados iesāktās kampaņas "Nē – kūlas dedzināšanai" aktivitātes un atbalsta LR Iekšlietu ministrijas atbildīgo institūciju cīņu ar iedzīvotāju neapdomīgo rīcību, dedzinot pērno zāli un tādējādi izraisot postošas sekas¹⁶.

It means that the key word or term, which should be repeated once again in the text, is shifted to become slightly different in form, but, preferably, not in meaning, e.g. in this example the unit is modified into another part of speech (*dedzināšana* – noun into *dedzināt* – verb).

The complicated character of the informative and vocative texts calls for extensive usage of repetition tools, to attract attention of the reader and manipulate with it causing a particular feedback.

It is significant to note that recurrence of lexical units does not always lead to complete recurrence of concepts, especially in the case of partial recurrence, as even minor changes in the shades of the meaning may deviate the meaning of a recurred word/term from the initial concept. As in the example provided, the translator has chosen to replace *kūla* with *pērnā zāle*, a term which is semantically almost identical.

¹⁵ retrieved from www.videsprojekti.lv in May 2008

¹⁶ retrieved from www.videsprojekti.lv in May 2008

The translator could replace the term *kūla* with the more general equivalent *sausā zāle*, but in this case it would lose its primarily semantic component, stating that this is the last year grass.

- **Parallelism**

An emphasis on particular information can also be put by using parallel constructions. The application of parallel constructions does not stress informativity of the text, but influences the situationality, as it underlines the importance of described situation or situation of occurrence. “*Parallelism entails reusing surface formats but filling them with different expressions*” (Beaugrande, 1980). For example:

*During the campaign in all territory of Latvia we will disseminate postcards and posters, in national and regional televisions will demonstrate video-clip, we will collect and summarise the information about this problem*¹⁷.

It is obvious that a series of similar, but not completely identical actions are expressed by parallel constructions in the simple future tense with a recurrent ‘we will’.

However, when considering the text in Latvian, it can be easily seen, that the pronoun ‘we’ is omitted and impersonal parallel constructions in the present perfect tense and past perfect tense are used instead.

*Kampanas ietvaros ir izstrādāti un visā Latvijā tiek izplatīti plakāti un kartiņas, nacionālajās un reģionālajās televīzijās tiek demonstrēts video klips, tika sagatavota, apkopota un tiek izplatīta informācija par kūlas ugunsgrēku ietekmēm un sekām*¹⁸.

¹⁷ retrieved from www.videsprojekti.lv in May 2008

¹⁸ retrieved from www.videsprojekti.lv in May 2008

Parallelism is a widely applied cohesive device, as it not only stresses the importance of information provided in the text, but also explains in other categories, why this information is considered to be significant, e.g.:

The inventories are focussed on those species, which are threatened and are of highly conservation value in the European Community¹⁹.

Inventarizācija ir vērsta uz sugām, kuras ir apdraudētas un kurām ir īpaša dabas aizsardzības vērtība Eiropas Kopienā²⁰.

These sentences state that some species are threatened and also explains that they are of high conservation value on the European scale. Parallel constructions make the text vivid and not overloaded with unnecessary explications about some aspects and factors.

- **Paraphrase and Synonymy**

The question of paraphrasing is closely related to the question of synonymy, which is a type of reiteration, that is why they are going to be analysed together.

The notion of synonymy has been actively investigated by many prominent linguists (e.g. Quine 1951, Palmer 1981, Carter 1998). Synonymous words differ functionally and have distinct connotations, which means that various application nuances should be taken into consideration.

Paraphrase is “...*the reference of content with a change of expressions...*” (Beerbohm, 1958), which implies the choice of other words to express the same idea. And if synonymy is usually applied to substitute word/term or complex lexical unit, then paraphrase is used for the substitution of a syntax unit, i.e. phrase, sentence, clause. However, despite the difference both of them are influenced by situationality,

¹⁹ retrieved from www.videsprojekti.lv in May 2008

²⁰ retrieved from www.videsprojekti.lv in May 2008

which affects the outlook adopted and methods applied. In order to illustrate this phenomenon the following example is considered:

The purpose of the Project was to attract Latvian society's attention to the problematics of the climate change, to raise awareness and knowledge about importance of this issue and also to develop deeper understanding of it²¹.

In this example the words *awareness*, *knowledge* and *understanding*, are used as partial context-dependent synonyms, which are paraphrased lexical labels of the same context, and are applied in order to avoid monotony and improve the efficiency of the text. The same approach has been adopted in the Latvian variant of the text as well.

Īstenotā projekta mērķis bija pievērst Latvijas iedzīvotāju uzmanību klimata pārmaiņu problemātikai, veicināt šī jautājuma nozīmības apzināšanos sabiedrībā un radīt skaidrāku izpratni par to²².

However the number of paraphrased synonymic constructions in Latvian is smaller than in the English language variant.

The above examples show that it is difficult to suggest even one pair of words, which would be completely synonymous, especially in all possible contexts. Moreover, in translation, and especially in technical translation it is impossible to consider meaning relations and meaning shifts of a particular word/term separately from the situation, i.e. separately from its pragmatic aspect.

In case of synonymy it may be useful to apply componential analysis, as it helps us to identify essential or primary and complementary or secondary constituents of the meaning of a particular word/term. This meaning can be suitable not only for the particular context, but also for similar contexts.

²¹ retrieved from www.videsprojekti.lv in May 2008

²² retrieved from www.videsprojekti.lv in May 2008

The formulation of such generalised approach to the application of paraphrase is strictly influenced by the fact, that this cohesive device is not only a context-dependent tool, it is a user-dependent tool as well, which in the majority of similar cases will result in at least different, unpredictable lexical expressions.

- **Reiteration and Collocation**

According to H. Niske (1999) reiteration is a form of lexical cohesion which involves the repetition of a lexical item. There are several types of *reiteration*:

- **Repetition** (one and the same concept is repeated)

Repetition is very similar to recurrence and/or partial recurrence, but sometimes it is considered to have mostly a negative connotation, as extensive repetition damages the structure and the content of the text, makes it less coherent.

The following sentence can be considered a good example of the negative effect of the extensive repetition of the noun – *elaboration* and verb – *to elaborate*.

*A preliminary design, recommended as the bases for the elaboration of the technical design was elaborated in the framework of the project, a concept for establishment of a National Cyclotron centre was elaborated and approved under the order No.668 of the Cabinet of Ministers of the Republic of Latvia...*²³

The same effect can be traced in the sentence written in the Latvian language.

*Projekta ietvaros izstrādāts skiču projekts, kas rekomendēts par pamatu tehniskā projekta izstrādei, izstrādāta un ar LR MK rīkojumu Nr. 668 apstiprināta ražotnes izveides koncepcija...*²⁴

²³ retrieved from www.videsprojekti.lv in May 2008

²⁴ retrieved from www.videsprojekti.lv in May 2008

In order to avoid this problem it is advisable to apply other cohesive devices mentioned above, which help us express the same concept in other words and do not make the text dull and monotonous.

- **Hyponymy** (superordinate vs. subordinate concept)

Hyponymy characterizes the relations between the general term and its concrete specific variations, or between the general meaning and special meanings or shades of the meaning of the concept. According to T. Johns (1999) hyponymy is the technical term for *included meaning*.

...one of the tasks was to develop visual materials - a film and photographs of cooperation partners...

... viens no uzdevumiem bija izveidot vizuālos materiālus – filmu un fotoattēlus par sadarbības partneriem...²⁵

In the above mentioned examples a hyponymic relation is established between the superordinate ‘*visual materials*’ and subordinates ‘*film*’ and ‘*photograph*’. We can draw the same parallels in both English and Latvian texts.

- **Metonymy** (application of closely related terms to substitute one another, whole vs. part)

The substitutions are based on contiguity rather than on similarity, as in the case of metaphor. Moreover, “...*metaphor creates the relation between its objects, while metonymy presupposes that relation...*” (cf. Blank 1999: 1971).

Supporting this declaration, on June 3, 2005 the biggest 9 cities in Latvia – Daugavpils, Jelgava, Jurmala, Jekabpils, Liepaja, Rezekne, Riga, Valmiera and Ventspils ... signed the “Green Appeal to Latvian Cities”.

²⁵ retrieved from www.videsprojekti.lv in May 2008

Atbalstot šo deklarāciju, 2005.gada 3.jūnijā Latvijas 9 lielās pilsētas – Daugavpils, Jelgava, Jūrmala, Jēkabpils, Liepāja, Rēzekne, Rīga, Valmiera un Ventspils ... parakstīja "Zaļo aicinājumu Latvijas pilsētām"²⁶.

In both examples *cities* or *pilsētas* stand for the majors, responsible for and allowed to sign the agreement on behalf of the cities. However, very often metonymic relations are not very transparent and clearly recognisable in both languages, as they can be based on culture and/or community-specific associations, which might not be popular and known abroad.

- **Antonymy** (semantically opposite concepts)

It is the lexical-semantic relation which unites two lexical items, which have "opposite" or "contrasting" meanings. These lexical items can be single words or multi-word combinations, which are used in one sentence, paragraph, text. Antonymic relations are used, for instance, in order to have an opportunity to compare two or more opposite aspects of the same situation and decide, which one can be sacrificed, as in the following example:

Esot cits – kālija sāls maisījums, kas ir daudz dārgāks par parasto sāli; tas gan esot mazāk kaitīgs kokiem, bet bīstamāks elpvadiem²⁷.

Antonymic relations can also be applied to contrast the effects in the part-whole lexical relations:

The main conclusion is that road salt is harm for roadside vegetation, but it's homogenous background and specific weight in overall pollution to environment (especially in urban areas) is not significant²⁸.

²⁶ retrieved from www.videsprojekti.lv in May 2008

²⁷ retrieved from www.videsprojekti.lv in May 2008

²⁸ retrieved from www.videsprojekti.lv in May 2008

The harmful effect the salt produces on the roadside vegetation is opposed to the impact it has on the overall environment in the area, which is more significant.

S. Lahdenmäki (1989) calls all the above mentioned types of reiteration „...*(direct) synonym-type relations, since they all refer to another word which has the same referent...*”.

- **Collocation**

J. Renkema (1993) considers collocation to be any pair of lexical items that refer to each other in some recognisable lexico-semantic relation, e.g. “*pollution*” and “*wastes*”, etc.

In this case the nature of relation is indirect, it is more difficult to define, as it is based on associations in the mind of the author, which hopefully will cause the same associations in the readers’ minds.

Similarly to metonymy, these relations are also based on associations, but unlike the former, they should be internationally recognizable, i.e. culture and/or community-bound free.

Incorrect application of both metonymy and collocation immediately flags inconsistency in the intentionality – acceptability bound. In other words, unclear, ambiguous, non-transparent associative relationships lead to misunderstanding of information and distortion of acceptability.

■ Grammatical Cohesion

If lexical cohesion refers to the language content of the text, then grammatical cohesion refers to its structural content. According to J. Cutting (2002: 9) grammatical cohesion is “...*what meshes the text together...*”. It is much less likely to occur in texts which strive to be completely unambiguous, such as legal texts, or some kinds of technical texts.

• Pro-forms

Pro-forms are used to economise space, these are short words empty of their own particular content, which can stand in the surface text in place of more determinate, content-orienting expressions (cf. De Beaugrande & Dressler 1981).

R. de Beaugrande (1981) stresses the efficiency criterion as a prime motivation for the application of the pro-forms in the text. Undoubtedly, there should be found some trade-off between economising space, thus making the information compact, and a clear understanding of the information, i.e. clarity of it.

There exist two types of pro-forms: anaphora and cataphora. Anaphora – usage of the pro-form after the co-referring expression (cf. Webber, 1978). It is the most common direction for the co-referencing, as it keeps the identity of the conceptual content of the initial expression.

In the following examples of anaphora in both languages the co-referring expression is *analysis* – *analīze* and the pro-form (pro-noun) is *it* – *tā*.

Analysis is concentrated across three thematic areas – climate change, biological diversity and land degradation, however it also explores synergies among these three areas²⁹.

Analīze ir koncentrēta trīs tematiskajās jomās – klimata pārmaiņas, bioloģiskā daudzveidība un zemes degradācija, turklāt tā pēta arī minēto trīs tematisko jomu savstarpējo sinerģiju³⁰.

However, the anaphora can be used only in the case of adjacent structures, otherwise, long-stretching texts after the initial expression and prior to anaphora can be troublesome.

The use of the pro-form before the co-referring expression is called cataphora (cf. Hymes, Hasan, 1976). It is applied to intensify the interest of the target audience, as it creates a clear focus on some block of the content. Therefore, pro-forms must always co-refer with the elements of the same type, e.g. pro-nouns with nouns, pro-verbs with verbs. For instance, the verb ‘do’ is often employed as a pro-verb to substitute and co-refer to a more determinate verb or verb-phrase. Cataphora in the environment-related texts is not widely used.

- **Ellipsis**

Another cohesive device contributing to the economising of the space and efficiency is ellipsis (R. Crymes, 1968 in Beaugrande and Dressler, 1981). This device allows the omission of some repeated or co-related structural elements in the sentence.

The application of ellipsis does help one produce the compact text, but the complete structure, which has been replaced by the elliptical one should be easily

²⁹ retrieved from www.videsprojekti.lv in May 2008

³⁰ retrieved from www.videsprojekti.lv in May 2008

recoverable. The phenomenon of ellipsis is more typical of literary texts, therefore, it is not going to be analysed in the present research.

- **Use of Tenses**

The phenomenon of cohesion can also be investigated on the grammatical level, following the tense and aspect issues.

Use of tenses belongs to such types of categories, which are organised differently in different languages. The correct use of tenses maintains the continuity of the text, shows whether the information is structured logically precisely in a cohesive way. It is extremely important as the sequencing of the information structures in the text gives some signals about the knowledge required to be applied in the process of reading, understanding and communicating information provided in the text.

- **Junctions**

The role of the junctions cannot be overestimated; they can be divided into conjunctions, disjunctions, contrajunctions and subordinations.

The typical *conjunction* is ‘and’, which is used in order to connect independent events or situations. It is also possible to use ‘moreover’, ‘also’, ‘in addition’, ‘furthermore’, etc. *Disjunction* in most of the cases is denoted by ‘or’, which sometimes is also used in extended variations, such as ‘either-or’, ‘whether or not’. *Contrajunctions*, in their turn, are signalled by ‘but’ (the most frequently used), ‘however’, ‘yet’, ‘nevertheless’, etc.

Subordination is used to link things of different status, i.e. one is dependent on another, as well as to connect situations, which are true only under certain conditions. It results in the type of connection called – *prerequisites – event or cause – effect*. It

can also be presented by a large selection of constructions: ‘because’, ‘since’, ‘as’, ‘thus’, ‘while’, ‘therefore’, etc.

The examples of the junctions in the English and Latvian language can be viewed in the Table 4:

Table 4

Junction Constructions in English and Latvian

Type of Junction	English Equivalents	Latvian Equivalents
Conjunction	and moreover also in addition furthermore	un bez tam/turklāt arī pie tam/turklāt turklāt
Disjunction	or either-or whether or not	vai vai..., vai vai..., vai
Contrajunction	but however yet nevertheless	bet taču/ tomēr tomēr/ neskatoties uz to tomēr
Subordination	because since as thus while therefore	tā kā/ tāpēc ka kopš/ tā kā jo/ tā kā/ tā tā/ tādā veidā kamēr/ kaut arī/ lai gan/ turpretim tāpēc/ tādēļ

The number of junction construction in the Latvian language is smaller than that in the English language, which means that the semantic content of the junctions in the Latvian language is broader than the semantic content of junctions in the English language.

Junctions definitely make the reception of the text easier, because they show the inbound relation between the events described and create the necessary attitude towards the information, even prior the whole message is read. Undoubtedly, this rule

is valid only in the case of micro-contexts (normally, within the sentence), where the information structure does not, and basically should not, change so quickly and dramatically. It means that the use of junctions helps the text-producer to organize and present the text in a more efficient way.

Analysing patterns of modern term formation and application it is particularly relevant to analyse the channels in the text through which the special meaning is communicated in the surrounding environment. If we are to approach the textual analysis from the point of view of meaning creation and communication, then the text refers to the semantic level of communication, i.e. meaning, while context to the pragmatic level - i.e. its application. Therefore, the meaning of a text “...*resides not in the structural roles played by its words, but in its unbounded context...*” (Hamilton, 2003).

In order to trace the interaction between a text and a context it is important to describe these notions and consider textual features and their relationship to contextual factors.

2.3. Context

Context is a key concept in many scientific disciplines, for example, the field of pragmatics, computer linguistics, text linguistics etc., and it often means quite different things even within one scientific discipline. There are many linguists, who believe that the nature of context is very manifold and deserves a more detailed investigation. The difficulty in defining the notion of context is caused by the fact that contexts are not prearranged, but mostly created for a particular situation.

Context can be defined and used in a variety of ways:

- context is a *frame* (Goffman 1974, Vakkari 1997, Warner 2002), which surrounds the phenomenon and, thus makes it meaningful and understandable;

- context is an *environment* (K. Athur 1933/ 1994: 19, Scharfstein 1989:1) in which something dwells and exists;
- context is a *background* (G. Althen, Doran A.R., Szmania S.J. 1988/2003: 57, H.H. Stern 1983/2003: 48) in which a particular thing occurs;
- context is a *perspective* (Bergquist & Phillips 1977: 146-9, Hobart 1985 in Holy 1998:53) from which some phenomenon should be studied;
- context is a *stage* (O. Costas 1982: 4-5) on which the particular phenomenon should be revealed.

One of the universal definitions of the context has been provided by Goodwin and Duranti (1992:3 in Holy L. 1999: 49 in Dilley R.), who have stated that the context “...*implies a fundamental juxtaposition of two entities: a focal phenomenon and an environment within which it is embedded...*”. Therefore, the surrounding environment in which the communication takes place can be viewed as the combination of many factors, and, thus, the comprehension of context complex nature is closely related to the analysis of those factors/dimensions.

According to some linguists (cf. L. Holy in R. Dilley 1999: 47-60) context comprises a variety of constituent elements, (subject matter, participants, medium, setting, etc.), which can differ in their roles, functions and purposes of application and, thus, generate different contexts. It means, that number of contexts, even with the same constituent elements, in which the particular phenomenon can be positioned is practically endless. Therefore, the context is dynamic and it is “...*constantly being changed by the act of communication itself...*” (Hewings and Hewings 2005:23). In other words, the constituent elements of the context themselves form the present and further developed contexts.

One of the first linguists to deal with the analysis of the context and its role in the communicative act was B. Malinowski (1923: 306), who introduced the notions of ‘the context of culture’ and ‘*context of situation*’. ‘Context of situation’ is defined as “...*the situation in which words are uttered can never be passed over as irrelevant to*

the linguistic expression...”. One of the key aspects of the ‘context of culture’ he considered the social aspect (social role of the participants, their behaviour, etc.), and suggested that the language should be “...regarded and studied against the background of human activities and as a mode of human behaviour in practical matters...” (Malinowski 1923: 312). It means that in the context of a particular situation, the anthropological perspective of analysis should also be taken into account. B. Malinowski did not investigate the impact of the context on language choice, but he was one of the first to identify the need to research pragmatic perspective of communication, suggesting that “...the real knowledge of a word comes through the practice of appropriately using it within a certain situation...” (Malinowski 1923: 325).

The most often used model which analyses information within certain situation and relates text to context is the one proposed by M.A.K. Halliday (1978: 142), who believes that the context of situation should be characterized in terms which will reveal the systematic relationship between language and the environment. According to M.A.K. Halliday (ibid.), the model concerns some form of theoretical construction that relates the situation simultaneously to the linguistic and social systems. In other words, it is significant to investigate context at the level of the particular text (implicative and explicative information), at the level of knowledge organization and representation (intentions, background knowledge, linguistic means and their choice) and at the social level (surrounding environment of the communicative act).

H. Bunt (1995) defines context as the combination of factors which are relevant for the understanding of communicative behaviour. He distinguishes five major dimensions of the context: the linguistic context, the semantic context, the physical context, the cognitive context and the social context.

According to Bunt (1995:202), the social context comprises “...the roles of the participants in the particular communicative situation with their specific communicative rights and obligations...”. When analyzing social context, it is significant to take into consideration the setting in which the communication occurs

(internal – type of communication; external – situation in the community), social roles of the participants and the factors which influence social status of the participants. These aspects activate the social norms that, in their turn, generate certain behavioral responses.

The necessity to consider the social dimension of the context analysis has also been emphasized by Kress and Hodge (1979:13). They state that “...*without immediate and direct relations to the social context, the form and functions of language are not fully explicable...*”. The idea to consider the social context above other has been supported by many prominent linguists. (e.g. A. Holiday 1994, R. Brown 1996, J. Holmes 1988)

Linguistic context is closely related to the standard of intertextuality and is concerned with the analysis of a prior context of situation, which occurred before the particular context, the implementation of the present context and the study of its constituent linguistic variables (generic conventions, register requirements, textual environment, etc.). The investigation of the linguistic context also implies the analysis of meaning at the level of a word/phrase/sentence/utterance/text and considers the principles governing the choice and selection of particular lexical items.

The semantic context provides “...*meaning through relating the metadata descriptions to vocabularies/ontologies defining the domain in question...*” (N. Sanderson, V. Goebel, E. Munthe-Kaas, 2005:1372). It is of relevance for the comprehension of information encoded in the text. According to L. Baker and A.L. Brown (1984: 353-94), the semantic context functions as a cue to the meaning of a single word presented in the context, but it has even a greater role in making predictions about subsequent information and in organizing word meanings into the meanings of larger and high-order units such as phrases, sentences, and the extended text. In other words, the semantic context represents the organization and structuring of the semantic information, i.e. meaning, within one unit of information.

The study of the physical context is a necessary aspect of communication analysis, as it concerns the research of the target audience (model of behaviour) and

surrounding environment (organization and setting). In other words, it is the physical setup of the given context, which according to H.H. Clark (1996) forms “...*the perceptual basis for personal common ground...*” (in W. Croft 2000: 94).

The cognitive context comprises the world knowledge and the background knowledge of the participants of the communicative act. It studies various aspects, which may “...*influence processing, perception, production, interpretation and evaluation...*” of information in the communicative act (cf. Bunt, 1995: 203).

The analysis of the cognitive context deals with the investigation of such aspects as the purpose of the communication, individual goals of the participants, their concerns and beliefs, attitudes towards the theme of communication and other participants, their initial intentions and plans, as well as “...*attitudes that are affecting the underlying task and the continuing of communication and current active topics...*” (Bunt 1994: 19-31). This theory of language in use or pragmatics “...*rests on the assumption that the language users, being members of society, depend on the rules and norms that are valid at any time, in any place, in the community they belong to...*” (Levinson, 1983:2), or, according to J. Mey (2001:6) “...*pragmatics studies the use of language in human communication as determined by the conditions of society...*”

The definition of ‘context’ as ‘knowledge’ was offered by J.L. Austin (1962), the author of the speech act theory and later developed by H.P. Grice (1975) and J. Mey (1993) who defined context as knowledge, situation, and co-text (linguistic context). They considered knowledge as the main factor determining the use of a language.

M.A.K. Halliday and R. Hasan define text as “...*a unit of language in use...*” (1976: 1) and Miller as “...*a fragment of the culture that produces it...*” (Miller 1993)³¹. Following the division of the context proposed by B. Malinowski (1923), which has been further developed by M.A.K. Halliday (1978) and D. Butt et al (2000),

³¹ In Manfredi, Marina (2008) *Translating text and context traslation studies and systemic functional linguistics*. Bologna: DUPress.

“...a text always occurs in two contexts, one within the other...” (Butt et al. 2000: 3). This assumption can be illustrated by the following figure:

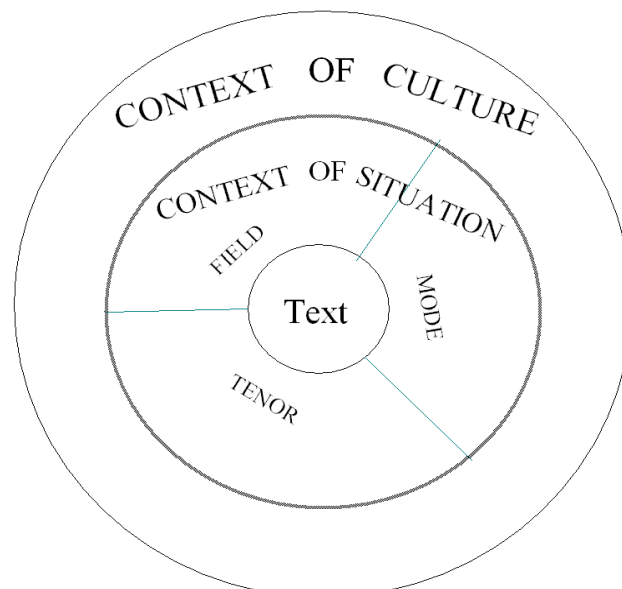


Figure 2. Text in Context (adapted from Butt et al 2000:4)

It means that any text produced in a certain community is related and dependent on the internal ‘context of situation’ and external ‘context of culture’, as it transmits knowledge on the particular subject matter, which is embedded in a certain surrounding environment (realia).

The ‘context of culture’ studies the meaning of a text at the extra-linguistic levels, while the ‘context of situation’ is considered to perform the analysis of the textual environment at the linguistic level.

According to M.A.K. Halliday (1978) the ‘context of situation’ comprises three main components: ‘*field*’, ‘*tenor*’ and ‘*mode*’, whereas *field* concerns the subject matter, *tenor* observes interlocutors/participants and their status and role, and *mode* regards to the linguistic means relevant for the organization of the text. The ‘context of situation’ is linked to the investigation of the notion of register, which is defined as “...a functional variety of language...” (Halliday 1985/89: 38 ff) and interacts best with the standard of *situationality* (Hatim and Mason, 1997), as the register analysis

deciphers the “...relationship between a given situation and the linguistic choices which will be made within it...” (Manfredi 2008:80).

C.S. Butler (2003: 395) supports the view that the study of register is relevant to link text and context, but he also emphasizes that “...the concepts of text and context have always been strongly related through the concept of cohesion...”, i.e. through the internal organization of the text at the surface level. The application of the cohesive devices in the text allows the researcher to understand, if the author of the text addresses the reader directly (e.g. applying pronouns), if s/he applies the linguistic clues, which could clearly identify the status of the author-reader relationships (e.g. teacher - scholar; instructor – student, etc.), if the author makes use of repetition (emphasizing the relevance of the content for the users of the text) or substitution (making the text easy to read and comprehend) (cf. G. Leech and M. Short 1981/2007: 62).

According to H. Vater (1994:65)³² the most dominant criterion of textuality, which is responsible for the establishment of the text and the understanding of its meaning in the surrounding environment, is the coherence. Fritz (1999:221-2) holds the same view stating that “...coherence is regarded as a guiding principle for text production and as the basis for understanding texts...”. It is the complex “...conceptual structure that is created in the mind by the co-occurrence of terms...” (Shreve 2001: 782) in a text within a certain communicative setting.

Texts are perceived and comprehended in a variety of ways by different users, depending on their psychological disposition, cultural and social values, personal interest and, even more, on their background knowledge, professional competence and the knowledge of related texts. As J. Lemke (1988:165) states “...it is not just by construing semantic relations to the immediate textual, or even situational, context that we make a word or phrase mean. It is also by construing relations to other texts and situations in which that word or phrase has been used...”. It means that the understanding of the text (especially scientific technical text) in a certain surrounding

³² In Janoschka, Anja (2004) *Web Advertising*. Amsterdam/Philadelphia: John Benjamins.

environment is highly conditioned by the standard of intertextuality, i.e. prior knowledge of the readers of the similar texts in the similar contexts.

Terms are applied in the texts, therefore they are textually conditioned. In order to contribute to the popularization and faster promotion of the novel terms in a certain community, today “...*the documentation of terminology almost always includes capturing and documenting contexts...*” (Shreve 2001: 777), which, in its turn, should guarantee the correct application of the terms in the texts. The proper usage of terminology determines, to a great extent, the acceptability of the text by the readership. The acceptability of the terms also influences the adaptation of the terms to the context of their application: linguistic (conforming to the adjacent words) and socio-cultural (choice of the term appropriate in the particular communicative setting).

The selection of the appropriate terms influences the acceptability of the text by the receiver, and reflects the intentions of the sender of the information. The receiver of the text may “...*recognize the intentionality but still not know the intention...*” (Widdowson 2004:8). Intentionality refers to the reasons which have motivated the author of the text to select the particular field for the discussion, apply the particular linguistic means and, thus, contact the certain audience. According to C. Nord (1988/2005: 124) “...*it is the pragmatic aspect of intentionality in the sense of ‘concrete interest’ underlying the text production which is being analysed in this context...*”. The same idea has also been expressed by R.C. Neville (cf. 1989:293), who states that it is the intentionality, which employs the representation of the field to provide a context in which the text is created.

The expectations of the readership of the particular text created in the certain context can be analysed from the standpoint of their informativity. It comprises knowledge of what people are expected to know in the particular context of situation. The informativity-sensitiveness of the particular terms makes the text highly context-dependent, as they can be comprehended only within a particular context, and their position in the text influences the information the text conveys. The standard of informativity is closely related to the stylistic analysis, as the authors of the texts very

often use terms belonging to distinct registers and, thus, challenge the expectations of the reader. These factors may well result in the application of the terms, derived from other scientific disciplines, which literally mean the same as the more appropriate term, but stylistically does not fit the context of situation. However, these terms frequently do not cause any difficulties in communication, as “...*the context eliminates from consideration the meanings possible to the linguistic form other than those the context can support...*” (cf. Hymes 1962:19). This assumption should also be taken into account when dealing with polysemous terms and/or homonyms, e.g.: *solvency* (financial – paying capacity or wealth) - *maksātspēja* and *solvency* (technical – solubility or dissolution) – *šķīdība*; *soundness* (medicine - health) – *veselība* and *soundness* (technical - density) – *biezums, blīvums*.

The analysis of meaning in the particular context, or, in other words, of meaning in use, is a complicated manifold process, as “...*it is often very difficult to say precisely what a word means if we ignore its use and context...*” (W. Hughes, J. Lavery 2005: 47). Modern terms, especially neologisms and occasionalisms, which do not yet have the stable positions in the concept system of the particular field of knowledge, spread in the language very quickly and depend on the context.

2.4. Summary

The study of modern terminology is directly connected with the development of text linguistics. The theory of text linguistics in general and the standards of textuality in particular, have been investigated to analyse modern trends of terminology formation and application.

The standards of textuality are relevant for the present research due to the change in the traditional structure and the organization of scientific technical texts. Under the influence of such factors as globalization, the rapid development of new

technologies, an increase in the volume of information, an increase in the number of scientific popular and technical publications, the characteristic features of technical texts have changed. Texts on environmental and ecological issues have been chosen for the analysis as they most fully reveal the main tendencies of the contemporary text development.

To illustrate the manifold nature of the environment-related texts, the identification of the major directions in which environment-related texts are produced, the main characteristic features inherited from these directions for each type of the text have been considered. Therefore, these texts are very complicated in their nature. They are not homogenous, but multidisciplinary, and they are structured by adopting the standards and principles of text organization characteristic of each particular type of the text.

The necessity to perform an analysis of a text is caused by the fact, that the changes in the content and structure of the technical texts, in their turn, influence the characteristics of a modern term, explaining, to some extent, the new patterns of term creation, as well as the application of the expressive means (the metaphor, metonymy, epithet, etc.) in their formation. It demands from the researcher to pay special attention to the analysis of text types, the individual style of the author of a particular text, relevant generic conventions and register requirements. Such characteristics of the contemporary terms as the precise meaning, correctness of its application and its appropriateness in the text, are highly context-dependent.

If we are to approach textual analysis from the point of view of meaning creation and its communication, then the text refers to the semantic level of communication, while the context to the pragmatic level - i.e. meaning use. It is difficult to overestimate the role of pragmatics in the contemporary terminology development, as context comprises a variety of constituents, such as the subject matter, medium, setting, participants, etc. which can differ in their functions, thus, generating different contexts, practically endlessly. Therefore, communication for special

purposes can be viewed as a combination of many factors/dimensions, and, thus, the comprehension of context complex nature is closely related to the analysis of those factors/dimensions.

In order to trace the interaction between a text and a context it was important to describe these dimensions and consider the textual features and their relationship to the contextual factors, which demanded and caused the elaboration of the principles characteristic of the process of modern term formation and application.

The problem of the text structure and organization is the central problem of both the theory of translation and contrastive linguistics, as the text is a key object for comprehension, when the original material is analysed and interpreted for the meaning decoding it into another language and the further analysis of the textual environment of both the original and the target text.

A thorough investigation of a textual environment is the starting point for a detailed lexical/terminological analysis and one of the prerequisites for the contrastive studies. Today the analysis of terminology used in the texts should be performed on the contrastive basis, as these terms are conventional, internationally understandable and recognizable. The necessity of the research is conditioned by the lack of both theoretical and empirical contrastive studies on terminology formation and application between the English and Latvian languages.

3. Contrastive Analysis of Terminology in the Thematic Field “Environment and Ecology”

It is significant to take into consideration the fact that the European languages have much in common, and it allows scientists to compare and contrast them at various levels, and, especially, at the textual level. When carrying out analysis of scientific and technical terminology, its development tendencies, as well as application and translation, it is quite useless to study it only within one particular language.

One of the topical, but less investigated scientific fields in the English and Latvian languages is the thematic field “environment and ecology”, which includes special terms common to many scientific and/or technical domains and related to semantic fields and subfields, such as: environment protection, environmental economics, ecology, climate, meteorology, biosphere etc. The interdisciplinary nature of the environment-related texts makes translation and contrastive analysis of terminology very complicated. This demands a thorough investigation of special lexis embedded in these texts.

Method and techniques used to determine the meanings of terms, translate and contrast them have been developed greatly, and are based on the following types of analysis:

- the semantic approach: (meaning formation patterns, semantic fields, thematic fields, componential analysis);
- the pragmatic approach: contextual analysis (meaning in context, discourse, register and genre analysis);
- the semiotic approach: special symbols related to the subject of research (visual representation of the meaning, professional symbols, topographical maps, blissymbolic signs for international communication, etc).

Detailed analysis of the contemporary patterns of special meaning formation, the influence of the context on the communicative function the terms perform in the texts, the varieties of symbolic representations of terms, is very important for further development of terminology.

Over the past three decades, there was a significant change with regard to the terminology analysis – from the traditional aspects, i.e. *word-formation patterns*, to *semantics* (meaning formation patterns used to coin new terms) and *pragmatics* (the application of terms in the particular communicative settings).

The understanding and perception of the notion *semantics* varies in terms of the prevailing focus of the research conducted, i.e. *to study the meanings of lexical items* (meaning-formation patterns, the link between a meaning and an entry term used to denote it, etc.), *to investigate implementation of the meaning in context* (analysis of the socio-cultural factors, the role and functions of the lexical item in the communicative setting) or *to analyse the visual representation of the meaning* (symbolic elements, compression of information, etc).

Therefore, a perfect semantic analysis is a complicated system of various tasks, dependent on the predominant focus of the research, i.e. *semantics*, *pragmatics* or *semiotics*. However, this division is absolutely artificial, as no clear lines can be drawn to split semantics from pragmatics or semiotics in lexical (and also in terminological) analysis.

According to some prominent linguists (Palmer 1981, Goddard 1985, Pustejovsky 1995, Saeed 2003) the fundamental lexical semantic analysis comprises investigation of the *intra-linguistic* and *extra-linguistic* components.

- **intra-linguistic components:**

- semantics (representation of the meaning, meaning formation patterns);
- semantics and pragmatics (the pragmatic approach, context and real-life situations – text linguistics, contrastive analysis, translatology);
- semantics and semiotics (the semiotic approach, special symbols and characters, decoding and encoding, compression of information – the role of computer linguistics and corpus linguistics).

- **extra-linguistic components:**

- cognitive skills (processing information, contrasting and comparing various elements, analysing);
- socio-cultural competence (the role of socio-cultural diversity in the meaning-formation processes);
- encyclopaedic knowledge.

Depending on the purpose of the particular semantic analysis these components can be structured in numerous ways to provide sound foundation for the conducted research. Some of them can be highlighted, while others just flagged, that will impact the core aim of the analysis and influence the overall results. The present research will focus mainly on the investigation of the intra-linguistic components relevant for the analysis of terminology of the thematic field “environment and ecology”.

The semantically- and pragmatically-based view of terminology allows us to investigate and analyse terminology not in terms of the structural (morphological term formation patterns) conventions, but rather as a meaning formation practice, which is

influenced by numerous complicated semantic relations among terms and is determining the role of the particular term in a given communicative situation.

The communication for special purposes implies application of many terminological units, which do not simply represent the object in the real world, but refer to a concept (or even a system of concepts). It means that a term not only has a *formal meaning* (designation), but also *semantic meaning* (concept), and even *pragmatic meaning* (function and use). The combination of these features should, theoretically, make every term unique and eliminate any ambiguity and wrong applications. However, the scientific and technical fields are constantly developing, and new terms enter language every day, which means, that the coinage of new terminological units is still limited by “*the regularity in word-formation processes – word formation types, paradigms which the word has to fit and analogies with similar words*” (Veisbergs, 2001:7). Therefore, in order to denote new notions and concepts, the already existing language resources are applied, which contribute to the extensive application of the words of general language in various combinations.

New scientific concepts very often appear in distinct linguistic communities at the same time, and can enter one particular language simultaneously. It may result in the application of various loanwords of different origin and even lead to the creation of semantically deviated entry terms for one and the same phenomenon.

The terms of the thematic field “environment and ecology”, can be grouped into the following major categories, taking into account the semantic relations and the meaning formation patterns, which were applied to create them:

- Similarity of meanings of terms:
 - Synonymy
 - Doublets
 - Variants

- Semantic shifts:
 - Metaphorical Terms;
 - Colour Based Metaphorical terms;
 - Metonymical terms;
 - Terms based on allusion;
 - Terms created by analogy;
- Polysemy;
- Hyponyms/hyperonyms;
- Loanwords
 - Culture-specific items
 - Internationalisms
- Onomatopoeic elements;
- Symbolic representation

The analysis of these semantic relations and meaning formation patterns is of great importance especially in the contrastive aspect of communication and, hence, translation, as the translators should not only strive to achieve a merely semantic equivalence between the source and target texts, but a high correspondence in meaning, form and function (cf. Baker, 1992).

However, the translator should focus primarily on the conveyance of the meaning of the ST rather than on the creation of the corresponding form in the TL, therefore, a special approach to the translation should be adopted.

According to P. Newmark (1988b) the semantic approach to translation or *semantic translation* is “*appropriate for any text whose form has a high status in the source culture...as it respects the form of the original and keeps as close as possible to the exact meaning*” (Newmark in Chestermann and Wagner, 2002, 49).

Some scholars (Chesterman 1993, House 1997, Newmark 1988, Nord 1997) consider that semantic translation can be easily recognized as a translation because it tends to reflect the main idea of the original precisely, however, it is still aimed at preserving the form and style of the source text. J. House calls this an ***overt translation***, which is normally “*written in a more marked style, preserving indicators that tie the text to its original culture*”. (House, 1997, 64). The similar distinction has been suggested by C. Nord, although, she has used a different term to denote this phenomenon, i.e., ***documentary translation***, which “*is one that acts openly as a document referring to a text in another language*” (Nord, 1997, 53).

However, as the original meaning may be, or frequently is, expressed in the target language, by using lexical elements with a different semantic content, the semantic approach to translation should comprise the contrastive/comparative analysis of the lexical elements of both the source and target texts, and should involve register analysis. Register analysis helps us evaluate the intentions of the author, taking into account the background knowledge of the users (intertextuality, or, sometimes, even the interdiscursivity standard), and choose the appropriate linguistic means to express the desired meaning. In other words, register is “*...the meaning potential that is linguistically accessible in a given social context...*” (Halliday, 1978). This approach is extremely important when dealing with terminology, which is coined adopting various stylistic devices, i.e. the metaphor, analogy, allusion, metonymy, colour epithet as well as onomatopoeic elements.

3.1. Structural representation of Terminology in the Thematic Field “Environment and Ecology”

In order to perform the contrastive analysis of the terms of the thematic field “environment and ecology” at the level of their meanings (concepts), considering their applications, it is relevant to differentiate among various linguistic forms the terms can take.

The structural representation of terms concerns the application of the word formation patterns for representation of special meanings in the particular language. It implies the process of modification of the existing lexical units, i.e., affixation, compounding, blending, clipping, creation of multiunit terms, appearance of phrasal terms and other morphologically-bound structures (cf. Platonova 2009a: 172-186). According to the structural representation of the terms, they can be grouped into the following major categories:

- **simple terms** – simple terms are lexical units, which contain only one morpheme, e.g. *deer, rain, body, soil, land, acid*, etc. Simple terms can be easily used as a basis for forming new terminological units, which are “...formed by adjoining an affix to a lexical base, or are coined combining two lexical bases or a combining form and a lexical base, to which affixes can then be adjoined...” (Cabre, 1999, 85).
- **complex terms** – are terms, which consist of two or more joint combining morphemes or are made up of a combination of lexical units, which form a syntactic structure – terminological phrase. Such syntactic structures are more frequently used in special languages. Therefore complex terms can be divided into two categories:
 - **Complex terminological units** – derived terms, compounds, abbreviations, as well as terms coined by blending and clipping,

- **Terminological phrases** – abbreviations, phrasal collocations, compound phrases, set expressions, free-formed terminological expressions and collocations.

Complex terminological units can be formed by adding different affixes before the stem (*prefix*), between the stems (*interfix /infix*) and/or after the stem (*suffix*). This type of morphological derivation is frequently used in both languages. For example, there exist a variety of both native and borrowed prefixes in English and Latvian (Table 5):

Table 5

Examples of Prefixes in English and Latvian

Affix	Origin	Term in English	Term in Latvian	Affix
Counter -	Old English	<i>Countercurrent</i>	<i>Pretstrāva</i>	Pret-
Un-	Old English	<i>Unabsorbed</i>	<i>Neabsorbēts</i>	Ne-
Micro-	Greek	<i>Microorganism</i>	<i>Mikroorganisms</i>	Mikro-
Preter-	Latin	<i>Preternatural</i>	<i>Pārdabisks</i>	Pār-
Sub-	Latin	<i>Subclass</i> <i>Subdwarf</i> <i>Sublimation</i>	<i>Apakšklase</i> <i>Zempunduris</i> <i>Sublimācija</i>	Apakš- Zem- Sub-
Re-	Latin	<i>Reproduction</i>	<i>Ataudze</i>	At-
In-	Latin	<i>Inland water</i> <i>Inlet</i>	<i>Iekšēji ūdeni</i> <i>Ielīcis</i>	- Ie-

Compounding is widely used in both languages to create new terms. Taking into consideration structural representation of the terms, it is possible to delineate three types of compounds:

- **Hyphenated compounds** – two or more lexical units are connected with a hyphen, *kilowatt-hour* (*kilovatstunda*), *mass-produce* (*ražot masveidā*), *bio-contamination* (*biosfēras piesārņošana*), *wait-a-bit* – *dadzis*, *tree-grass-steppe* – *savanna*, etc.

This type of compounding is not very typical of the Latvian language; most of the English hyphenated compounds, when translated into Latvian, become solid or open compounds or even simple terms. However, it is very popular in English, for instance, the major part of derivational compounds in the English language is hyphenated, *cold-blooded* (*aukstasiņu*), *able-bodied* (*veselīgs*), *hard-wooded broadleaves* (*cietie lapu koki*), *air-conditioned* (*ar kondicionētu gaisu*) etc.

- **Open compounds** - consist of two separate words that are closely associated as one concept, e.g. *behavioral ecology* (*uzvedības ekoloģija*), *hawk eagle* (*vanags ērglis*), *blanket bog* (*augstais sanesu purvs*), *coastal area* (*piekrastes zona*), etc. In the majority of cases open compounds preserve their form when translated from English into Latvian.
- **Solid compounds** – written as one word, with or without any linking elements. When analysing solid compounds it is important to consider hybrid and neoclassical compounds.

The solid compounds, which contain Greek or Latin elements, are called neoclassical. They can be formed only from the elements of the Latin or Greek languages, e.g. *megapolis* (Greek, *megas-* and Greek *-pólis*) – *megapoliss*; *postponement* (Latin, *post-* and Latin *pōnere*) – *atlikšana*; or could be coined using the elements of both languages, e.g. *macrostructure* (Greek *makro-* and Latin *-strūctūra*) – *makrostruktūra*.

These compounds are often internationalisms, which preserve their structure and meaning in most of the European languages, however, when possible, these internationalisms can be replaced by the native terms, which are frequently calques of foreign terms, e.g. *megapoliss* – *lielpilsēta*.

Hybrid compounds are formed by using elements of the native language, as well as elements of foreign languages. A great part of the solid compound terms in both English and Latvian scientific and/or technical discourses are hybrid compounds, which usually contain an element of Latin or Greek origin and an element of the native language, e.g., *cilvēkfaktors* (Latvian *cilvēks* and Latin *factor*), *energoietilpība* (Greek *enérgeia* – and Latvian *-ietilpība*).

Blending – is one of the creative processes of term formation in modern scientific and technical English. New blends are continually entering the language, at an apparently increasing rate (cf. Lehrer, 1974). This method of word formation is a combination of clipping and compounding (cf. Veisbergs, 2001, 42), as, in order to produce new terms, the front and/or back parts of the combined words are clipped and then joined together to form a new term.

Blending is often studied not only from the linguistic perspective (phonetics and morphology), but also from the cognitive perspective (e.g. Ungerer and Schmid, 2006) (formation of new term, which should preserve the characteristic features of both elements and simultaneously denote a new distinct meaning).

The texts on environmental and ecological issues contain a lot of blends, however, both printed and electronic dictionaries include only a few of them. Many of the blends do not require additional explanation, as they are quite understandable and clear, however, when translating English blends into Latvian, they could preserve the international form, or could be translated word-for-word, and/or explained.

Blending is frequently studied together with clipping; therefore, the following types of blending can be distinguished:

- Blends consisting of a back-clipped first word and a full second word, e.g., *ecosystem* (ecology + system) – *ekosistēma*. This phenomenon can be well illustrated in both languages by the enormous number of terms coined by analogy with the back-clipped first part *eco-* (from *ecology* or *ecological*) – e.g.: *ecotopia*, *ecotage*; *bio-* (from *biology* or *biological*) – e.g.: *bioluminescence*, *bioregion*, *bioaccumulation*, *biofuel*; *geo-* (from *geography* or *geographical*) – e.g.: *geochemistry*, and even back-clipped two elements: *biogeochemistry*.
- Blends consisting of a full first word and a backclipped or foreclipped second word, e.g. *sealab* (sea + laboratory) – *zemūdens laboratorija*; *snowberg* (snow + iceberg) – the term is explained in Latvian as *ar sniegu pārklāts aisbergs*.
- Blends including both foreclipping and backclipping of elements, e.g., *smust* (smoke + dust) – there is no set translation of this blended term in Latvian, it is just explained as *dūmi ar putekļiem*; *smaze* (smoke + haze) – the term is explained as *dūmaina migla*; the term *smog* (smoke + fog) has preserved its international form in Latvian – *smogs*; the same situation is with the term *stagflation* (stagnation + inflation) – *stagflācija*. Blending can be used to form a new term from already shortened (abbreviated) forms of two terms, as in the following example, *xaser* (x-ray + laser) – *rentgena lāzers*.
- Overlapping blends, which according to Algeo (1977, 47-64) could imply both *phonemic overlap* (a syllable or part of a syllable is shared between two words) and *phenomic overlap and clipping* (shortening of two words to a shared syllable and then compounding them), e.g., *rurban* (rural + urban)

– the term suggested in Latvian is “*puslauku teritorijas*” – which is an explanatory translation of the English term.

Terminological blends, which exist in both languages, frequently include internationally recognisable elements, in order to facilitate the process of communication at the international level.

Terminological phrases – are complex syntactic structures, “...that are governed by the same rules that combine free phrases and are not formally distinguished by any specific feature...” (Cabre, 1999, 86). Therefore, it is essential for a translator to distinguish the following types of terminological phrases:

- **set terminological expressions** - these are complex terms, which should be used preserving their initial structure (word order, form) and without any lexical changes (no lexical shifts, such as substitution, application of synonyms, hyponyms, etc are possible). Set terminological expressions contain more than two lexical units, which help us distinguish them from the open terminological compounds (which contain two words).

Normally set terminological expressions present no difficulties for translators, as they are registered in dictionaries and have standardized equivalents, e.g., *cost-benefit analysis* – *izmaksu-ieguvumu analīze*, *cost-effectiveness analysis* – *izmaksu-efektivitātes analīze*, *economical-ecological efficiency* – *ekonomiskā un ekoloģiskā efektivitāte*, *botanical name* – *latīniskais nosaukums*, *ecological coherence* – *ekoloģiskā mijiedarbība*, *ecological stability* – *ekoloģiskā noturība*, etc. The expressions written with a hyphen in English, in some cases preserve a hyphenated form in the Latvian language, e.g., *cause-effect relation* – *cēloņu-seku mijiedarbība*.

- **free-formed terminological expressions** – are occasional and particular context-bound syntactic structures. In order to understand them, a very high degree of intertextuality or even interdiscursivity is demanded, in other words, if a

translator does not have a sufficient level of background knowledge in the selected field, it will be very difficult for him/her to single out the terminological expression from the text and to translate it precisely into another language. However, sometimes such syntactic structures may become set expressions. Very often they are created *ad hoc*, by combining the existing open compounds and other lexical units, e.g., *vector control adviser* (vector control + adviser) – *slimības pārnēsātāju kontroles speciālists*.

- **Collocations** can be easily distinguished from open compounds taking into consideration the fact, that in collocations substitution of one of the elements is possible, and the meaning remains the same, e.g., *disaster damage = accident damage* – *katastrofas izraisītais postījums*, while in the open compounds no substitutions can take place.
- **phrasal compounds** are formed with the help of prepositions and junctions. These terms can be written with a hyphen, e.g., *crown-of-thorns-starfish* (lexical unit *starfish* is often omitted) - *ērķšķukroņa jūraszvaigzne*; or without it, e.g., *tragedy of commons* – *ganību traģēdija*. Phrasal compounds in the Latvian language are written without a hyphen, but may also contain prepositions, e.g., *aizsardzība pret lavīnām* – *avalanche protection*; *akts par atkritumu izvešanu* – *waste disposal act*; and/or junctions, e.g. conjunction **and**: *flora un fauna* – *flora and fauna*.
- **Abbreviated forms** of terms are frequently used in the scientific technical discourse. They represent multiword terminological combinations, which exist only if all their elements remain in the same order, occur immediately adjacent to each other and preserve their initial grammatical (although depending on the individual grammar rules in each language) and lexical forms, and are written following all capitalization rules. The abbreviations can be divided into the following groups:

- abbreviations in English, which have an accepted translation and standardized abbreviations in Latvian, e.g. *BAT* – *best available technology* – *labākā pieejamā tehnoloģija (LPT)*; *BPT* – *best practicable technology* – *labākā lietojamā tehnoloģija (LLT)*.
- abbreviations in English, which have accepted translations, but without standardized abbreviations in Latvian, e.g. *CEM* – *continuous emissions monitoring* – *nepārtraukto emisiju monitorings*; *CR* – *contingent ranking* – *nejauša klasifikācija*.
- abbreviations in English, which have an accepted translation in Latvian, and the abbreviated form in Latvian fully coincides with the abbreviated form in English, e.g. *SAM* – *social accounting matrix* – *reģionālās attīstības iespēju modelēšana (SAM)*; *OMB* – *The Office of Management and Budget* – *Vadības un budžeta birojs (OMB)*.

Abbreviated forms are not generally supported by cross-referencing options in the dictionaries, and thus, are grouped into a separate list.

3.2. Similarity of Term Meaning: Synonymy, Variants and Doublets

Texts in the field of ecology and environment protection abound in a great deal of various types of terms with a high degree of substitutability and/or nearly perfect sameness of meaning. These elements (synonyms, variants and doublets) are always applied for a particular purpose; either to attract the readers' attention, provoke a particular reaction, strengthen the desired effect, avoid unnecessary repetitions, produce a more reader-friendly text and/or express information in the text in the precise, clear and unambiguous way. According to H.L. Piozzi (1804, A) "...a writer can employ them to great advantage by using them so as to heighten and finish the

picture he gives us...”. The modern trends of terminology formation allow extensive application of synonyms, use of doublets and a variety of linguistic variations, which sometimes point to the frames of special knowledge using the sources of general language.

The author of the present research proposes the following classification of the lexical items in the environment-related fields, which share some similarity of meanings (Figure 3).

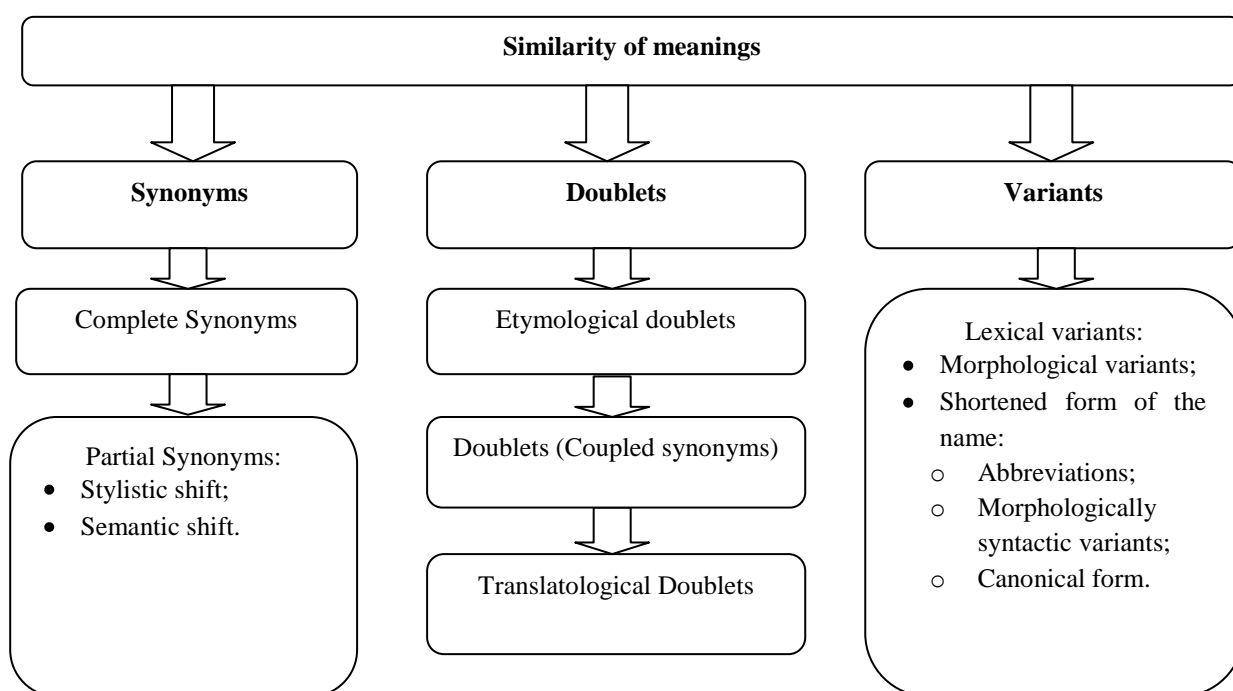


Figure 3. **Similarity of meaning: classification of the lexical items in the thematic field “environment and ecology”**

It should be pointed out, that there are lexical items, which fall into several categories simultaneously, which makes the process of terminology analysis even more challenging. In the following subchapters the author of the research describes the main characteristic features as well as provides supportive empirical data on the synonyms, variants and doublets from the above mentioned classification developed for the needs of the present analysis.

3.2.1. Synonymy

Traditionally synonymy was thought of “...as non-problematic issue in linguistics or translation, because we have either synonyms with meanings that are completely identical and hence easy to deal with, or we have non-synonyms, in which case they can be treated as just different words...” (Edmonds and Hirst, 2000,106).

The scientists that belong to the traditional schools of terminology (Wüster, 1991; Felber, 1984) even did not discuss the notion of synonymy. In their opinion terms should point directly to the core concept they denote. Such scientists as L. Bloomfield (1935) and Palmer (1981) shared their opinion, rejected the existence of synonymy and argued that not only terms, but lexical units in general, cannot have any alternative forms (variations, synonyms, doublets). They supposed that true or complete synonymy did not exist in any of the world languages. Complete synonymy is impossible because the meanings of words in monolingual and multilingual communicative settings are quite unstable and constantly changing. While partial synonyms (or near-synonyms) possess “...quite a complex nature and affect the structure of the lexical knowledge...” (Edmonds and Hirst 2000, 106).

Despite this fact, the notion of synonymy has been quite extensively analyzed by lexicologists all over the world, because synonymy is a popular phenomenon used to serve needs of communication for special purposes in the English language, today it still demands an even more detailed investigation in relation to different fields of scientific and technical terminology (ecology and environment in particular), as well as in relation to computational and text linguistics.

Some linguists (e.g. Edmonds, Hirst: 2000) argue that the notion of synonymy does not take into consideration the pragmatic perspective of communication, hence synonymy is represented as a completely context independent phenomenon. In the modern world the pragmatic aspect of communication is considered to be one of the most relevant. Therefore, to underline the needs for context analysis, the author of the

present research employs the definition of synonymy proposed by E. Nida and C. Taber (1969, 73), who state that

“...synonyms are words which share several (but not all) essential components and thus can be used to substitute one another in some (but not all) contexts without any appreciable difference of meaning in these contexts...”

A more detailed definition of synonymy formulated for lexicographic and/or terminographic purposes is proposed by the authors of Merriam Webster's New Dictionary of Synonyms (1984, 24), who consider that

“...a synonym ...will always mean one of two or more words in the English language, which have the same or very nearly the same essential meaning... they [words] are distinguished from one another by an added implication or connotation, or they may differ in their idiomatic use or in their application”...

It means that in modern linguistics synonymy can be described in terms of some sameness of meaning between words, context-dependent substitutability, but not in terms of exact replacement and complete semantic equivalence. Therefore, when studying synonyms, variations and doublets it is very important to ground research following the principles of two essential types of analysis: *componential* (lexical and semantic correspondence) and *discourse* analyses (register and genre requirements, stylistic correspondence, text elements and context).

In the present research the complicated nature of synonymy is going to be examined in order to investigate and illustrate its relation to terminology formation and communication processes. Therefore, it is very important to propose a sound classification of types of synonymy.

Many prominent linguists (e.g. Quine, 1951; Ullmann, 1962; Lyons, 1981; Cruse, 1986; Carter, 1998; Edmonds and Hirst, 2000) have analysed the phenomenon of synonymy and elaborated their classifications.

Quine (1951) and S. Ullmann (1962: 142) suppose that synonymy is perfect interchangeability of the lexical items in all possible contexts. It means that any pair of lexical items is not synonymous if any meaning component of an item alters the meaning of the context. This sort of synonymy can be considered absolute, however, some linguists (e.g. Carter 1998) consider that this overall substitutability can be stylistically limited.

J. Lyons (1981a: 148-9) differentiates between complete and absolute synonymy, stating that lexical items are “...*completely synonymous (in a certain range of contexts) if and only if they have the same descriptive, expressive and social meaning (in the range of contexts in question)...*”, on the other hand any lexical items are “...*absolutely synonymous if and only if they have the same distribution and are completely synonymous in all their meanings and in all their contexts of occurrence...*” (ibid).

It means that highly context-dependent items, according to J. Lyons are termed complete synonyms, while the notion of absolute synonymy is considered to be extremely rare. J. Lyons (1981b: 50-51) proposed a more detailed classification of synonyms:

1. synonyms are *fully* synonymous if, and only if, all their meanings are identical;
2. synonyms are *totally* synonymous if, and only if, they are synonymous in all contexts;
3. synonyms are *completely* synonymous if, and only if, they are identical on all (relevant) dimensions of meaning.

According to J. Lyons (ibid: 51) „... *absolute synonyms are expressions that are fully, totally and completely synonymous...*“, i.e. they include all three above mentioned categories; if any of the categories is omitted, then it is partial synonymy.

Synonymy can also be defined in terms of the sameness of intension and extension of a lexical item (Jones, 1986: 66). The extension of a term is its denotative meaning, which allows establishing a TYPEOF and CLASSOF synonymic relations between lexical items, e.g. *cat* would be synonymous to all representatives of the *class of cats*; *business* would be synonymous to all *types of business*. The intension of a term, in its turn, is “... *the set of attributes which characterise any entity to which the term is correctly applied...*” (Lyons, 1968: 454), e.g. *oak* denotes a *tree*. This classification is based on taxonomic relations.

A. Cruse (2000:156) shares the opinion of J. Lyons, that absolute synonymy may even be non-existent. He suggests a different classification of synonymy, defining synonymy as “...*words whose semantic similarities are more salient than their differences...*”.

A. Cruse (1986: 268) proposes to divide all synonyms into three types: *absolute, propositional, and near-synonymy*. *Absolute synonyms* are two lexical items whose all contextual relations are identical. *Propositional synonymy or cognitive synonymy* is established between lexical items if “...*X is a cognitive synonym of Y if (a) X and Y are syntactically identical, and (b) any grammatical declarative sentence S containing X has equivalent truth-conditions to another sentence S1, which is identical to S except that X is replaced by Y...*” (Cruse 1986: 88). This view is also supported by R. Carter (1998, 20) who suggests that synonymy is “...*essentially a bilateral or symmetrical sense relation in which more than one linguistic form can be said to have the same conceptual or propositional meaning...*” However, he does not hold the opinion of Quine (1951) and Ullmann (1962) that lexical items should be totally interchangeable in all possible contexts, but admits that the use of synonyms should

not provoke any “...changes in the propositional meaning of the sentence as a whole...”(Carter, 1998, 20).

Near-synonyms or partial synonyms could abound in a great number. They may be subject-specific and context-dependent as well as belong to various registers, i.e. may differ stylistically. According to M. Chodorow et al (1988, 144) partial synonyms illustrate “...a relationship of sameness of meaning between words, which is defined as the identity of their semantic representations...”.

For the present research it is relevant to analyse two categories of partial synonyms (near-synonyms), i.e.: partial synonyms with semantic shifts and partial synonyms with stylistic shifts.

3.2.1.1. Synonyms with semantic shifts

Synonymous terms with semantic deviations/shifts share some similarity of meanings and presuppose mutual context-dependent substitutability, but they are only partially semantically equivalent lexical items. Therefore, these terms should be analysed by describing, comparing and contrasting their semantic components. The distinct features of the synonyms are better observed when performing a componential analysis, which creates a basis for feasible comparison and makes the search for a corresponding equivalent (semantic equivalent – in monolingual communicative setting; target language equivalent – in multilingual communicative setting) easier. The following example is considered to illustrate the present phenomenon (see Table 6).

Table 6

Example of Componential Analysis

Component Term	Tract	Limits/ borders	Ownership	Covered by a body of water	Earth or soil	Latvian equivalent
Area	+	+	-	+	-	Platība
Zone	+	+	-	+	-	Zona/ josla
Land	+	+	+	-	+	Zeme/ zemes gabals
Territory	+	+	+	+	-	Teritorija/ apgabals
Ground	+	-	-	-	+	Zeme/ augšne

The terms *area* – *zone* – *land* – *territory* – *ground*, are quite frequently used to substitute one another in a variety of distinct contexts, however, as it can be seen from the above mentioned table, it is not possible to structure synonym pairs regardless of any restrictions. For instance, the term *area* could be synonymous to the term *territory*, if the component of ownership is not relevant in the particular context. *Land* is a more general term, which could be a synonym of any of the rest of the terms, unless the constituent meaning element, i.e. covered by the body of water, is omitted. The same tendencies can be observed in the Latvian language, e.g. the term *zeme* can be used as a synonym of other terms both in the sense of *zemes gabals* and in the sense of *augšne*.

This type of analysis allows us to faster and more precisely differentiate between synonymous terms in one language, and choose a corresponding translation equivalent for the needs of multilingual communication.

The performance of the componential analysis for the needs of the present research is absolutely crucial, being one of the instruments of the terminologist/translator/linguist to differentiate between terms. The thematic field “environment and ecology” contains a great deal of synonym pairs with semantic

shifts, e.g.: *colt – foal; deposition – rain – precipitation; alien – exotic; atomic – nuclear – radioactive; biotic – ecological; calorific value – energy value; dusting – spraying; diesel oil – diesel fuel; waste – refuse; ecological audit – environmental audit; elementary – subatomic – fundamental; energy – heat; manipulation – modification; battery – accumulator; tidal power – wave power; ancient tree – veteran tree; floating – swimming – drifting; rainstorm – cloudburst; methane – firedamp.*

3.2.1.2. Synonyms with stylistic deviations/shifts

It is the norm rather than the exception that modern specialised texts are multi-functional in their nature. They are not homogenous and contain a great deal of lexical items belonging to different registers. Since register is “...*a configuration of meanings, a register must also, of course, include the expressions, the lexico-grammatical and phonological features, that typically accompany or realise these meanings...*” (Halliday and Hasan, 1985: 39). This fact allows the variation across registers in monolingual communication (in one text) as well as in bilingual communication (in the source and target texts).

The above mentioned reasons give rise to creation of a variety of stylistically different synonyms of the existing terms, which, in the majority of cases, are metaphoric. These metaphors can appear as a result of the **combination** of the terms from various scientific disciplines, e.g.: *earthquake – earthtremor* (medicine); *hunting – fair game* (politics); *epicentre – focus* (engineering sciences); food **network** – food **web** (information technologies) or can be based on **similarity** in function, e.g.: *electric eel – horse killer* (the electric eel can easily stun or even kill a horse), *quicksilver – mercury* (mercury is of the same colour as silver, but with ability to move fast); *weedkiller – herbicide* (substance used for killing weeds); *ecosphere – bio-bubble* (a spherical dome); *wet season – rainy season* (can get wet easily).

Terms can also be created by applying various colour epithets, as for instance, using green instead of environmental (*environmental* accounting – *green* accounting). The same adjective can also be used to denote plants in general, e.g.: glasshouse – *greenhouse*.

3.2.2. Doublets

Doublets, according to Rankin (2009, 94) are “...words, which had the same mother word and at first the same meaning, but which have come down to us with different spelling...” and from different languages. They can be considered lexical items with close to perfect sameness in meaning. They have common etymology, but they have been transmitted into the modern language in different ways, therefore they differ semantically and/or stylistically, mostly due to the development of the language in the course of the years. Doublets may also take the form of coupled synonyms, which mean essentially the same thing, but are applied for the sake of clarity in order to avoid any misunderstanding, ambiguity or distortion of information.

The author of the present research proposes to divide doublets into three major groups: *etymological* (historically linked), *coupled lexical items* (semantically and pragmatically linked) and *translatological* (linked through translation).

3.2.2.1. Etymological Doublets

According to Abondolo (2001, 138) doublets are “...pairs (sometimes even triads and tetrads) of forms, which deviate, often quite strikingly, in both form and in meaning, but which can be shown to be historically related...”. As they indicate “...different channels of transmission...” (Lyons, 1971, 30-47) they often deviate in

their graphical and, hence, phonological form. According to Y. Malkiel³³ (1968, 142) “...systemic inquiry into doublets is a ‘narrow bridge’ between lexicon and phonology...”. Etymological doublets may be borrowed from the same language several times, but enter English through another language-mediator, e.g.: *cave* – *cavern* (both come from Latin *cavus* – meaning *hollow*, but the former entered English through French, while the latter – through German)³⁴. They may be derived from one and the same language in different periods of time, e.g.: *warranty* (French – 13-14 centuries) – *guarantee* (French – 16-17 centuries)³⁵. Etymological doublets may also be represented by lexical items with different chains of transmission, i.e. one comes directly from the origin (no languages-mediators), but another enters language through a language-mediator. Some pairs of doublets show a higher degree of phonological similarity, while other pairs can be hardly identified as doublets.

3.2.2.2. Coupled lexical items

Coupled lexical items or doublets (sometimes referred to as coupled synonyms) are used together mostly for the sake of clarity and are intended to avoid even minimal possibility of misunderstanding between users in the communicative setting. Although some researchers consider that the application of coupled synonyms makes the text elusive and complicates the understanding of the meaning implied in the text. According to D. Mellinkoff (1992, 129) “...the great mass of these coupled synonyms are simply redundancies, furnishing opportunity for arguing that something beyond synonymy was intended...”. The strings of duplicate, triplicate and sometimes even quadruplicate lexical items are very typical of legal discourse, but some examples are also encountered in the texts on ecology and environment protection, as the more topical the issue becomes, the more sophisticated legal base for governance, management, maintenance and control it requires. A great deal of various agreements and a range of projects are signed and implemented annually, which demand the

³³ In Abondolo, Daniel (2001) *A Poetics Handbook: Verbal Art in the European Tradition*. Surrey: Curzon Press.

³⁴ Retrieved from www.dictionary.com in September 2009

³⁵ Retrieved from www.dictionary.com in September 2009

translator to be proficient in legal terminology. The majority of doublet strings are expressed by one Latvian term, e.g.: *maintenance and upkeep* – *uzturēšana*; *power and authority* – *vara/pilnvara*; *null and void* – *spēkā neesošs*; *liens and encumbrances* – *apgrūtinājums*; however the same tendency to apply coupled doublets is also observed in the Latvian language, e.g.: *terms and conditions* – *noteikumi un nosacījumi*; *ends and means* – *mērķi un līdzekļi*.

3.2.2.3. Translatological Doublets

Translatological doublets appear because initial/original lexical items of Latin, Greek, French (all periods) or some other origin, were transmitted into the English language by more than one means. In the majority of cases the components in translatological doublets are synonyms or near-synonyms, frequently one being a translation option/variant of another. The following examples illustrate this phenomenon: **black** earth – **chernozem** (from Russian *чернозем*, literally meaning *black earth*); **boreal** – arctic/**northern**/polar (from Latin *borealis* literally meaning *nothern*); **pelagic** – aquatic/**oceanic**/marine (from Latin *pelagicus* literally meaning *pertaining to the sea*); **alluvial** – **washed up**/washed in (from Latin *alluvium* literally meaning *washed against*); **china clay** – **kaolin** (from Mandarin *Kao-ling* through French *kaolin*, literally standing for the name of the mountain in China, where the clay was originally dug-up); **Aurora Borealis** – **Northern Lights** (from Latin *aurora* – dawn and Latin *borealis* – *nothern*); **seism** – **earthquake** (from Greek *seismós* literally meaning *quake*); **trophic chain** – **food chain** (from Greek *trophikós* – *pertaining to food*); **Waldsterben** – **forest dieback** (from German *Wald* – forest and *sterben* – to die), etc. The choice of one or another lexical item does not alter the translational option in the Latvian language, but it might demand the translator to consult different dictionaries, as some of the lexical items belong to different registers and presuppose some background knowledge of the subject under discussion.

Another category of the translational doublets is formed from the names of the plants and most names of the species of the animal kingdom, as they possess double naming, one being scientific of Latin or Greek origin, while the other is more common and understandable, being in one's native language.

The names of Latin and Greek origin are historically-bound, known worldwide and are mainly used for the purposes of terminology standardisation, as well as to distinguish between various genera and subgenera of species and/or plants. However, even the application of Latin or Greek names may cause an inexperienced translator a variety of problems.

Table 7

Application of the Latin Adjective *Davidiana*

Term in Latin	Term in English	Term in Latvian
<i>Prunus davidiana</i>	Chinese wild peach	-
<i>Amygdalus davidiana</i>	Almond/ Chinese wild peach	-
<i>Pyrgilauda davidiana</i>	Small ground-sparrow/ Mongolian snowfinch	-
<i>Ostryopsis davidiana</i>	David Ostryopsis	Dāvida ostriopsis
<i>Photinia davidiana</i>	Chinese photinia	Dāvida fotīnija

The Latin adjective *davidiana* (Table 7) is rather frequently used in the publications on the environmental and ecological issues in English, and still it is rather problematic to choose the corresponding equivalents for these terms in Latvian, since, for instance, the plants they denote are untypical of the Latvian flora.

3.2.3. Variants

Perfect similarity of meanings between two or more terms can be achieved by applying variants, as they actually are *different word forms for the expression with the same meaning*. Variants represent complete sameness and a high level of substitutability of two or more lexical items. They, as different lexical item forms for the same concept, may be derived from lexical (morphological, abbreviated), grammatical (inverse order, irregular plurals), orthographic (graphical, phonetically graphical) and/or syntactic variations.

3.2.3.1. Lexical variants

Traditionally lexical variants differ from synonyms because synonyms are different terms denoting the same concept, while lexical variants are different word forms used for the expression of the same meaning. However, very often lexical variants are acquiring an autonomous status and, thus, can be considered different terms, but not forms of the same term. In the present research the author considers two types of lexical variants:

- **Morphological variants** – terms formed on the basis of the same lexical items by using such word formation patterns as, for instance, blending and clipping.
 - **Blending** is very frequently applied as a pattern for terminology formation in the English language. In the environment-related fields there keep emerging new variants of terms created using the blended forms of the most productive adjectives: ecological (eco-) and biological (bio-), e.g.: *biological control* – *biocontrol*, *biological diversity* – *biodiversity*, *biological energy* – *bioenergy*, *ecological sphere* – *ecosphere*, *ecological structure* – *ecostructure*, *ecological tourism* – *ecotourism*.

Most of the printed dictionaries in the field of ecology enlist both variants for the same concept. Similar tendency is also observed in the Latvian language, e.g.: *bioloģiskā kontrole – biokontrole, bioloģiskā daudzveidība – biodaudzveidība, bioloģiskā enerģija – bioenerģija, ekoloģiskā sfēra – ekosfēra, ekoloģiskā struktūra – ekostruktūra, ekoloģiskais tūrisms – ekotūrisms.*

However, the terminography development pace in English and Latvian is different and a large selection of the blended terms is not included in most of the printed dictionaries of the Latvian language, although is applied in publications quite extensively.

- In the English language **clipped** terms frequently are granted an autonomous status and, therefore serve as complete synonyms of their full forms. However, it should be noted, that clipped terms may acquire additional meanings or fall into a different register. The most widespread is **back-clipping** (when the final part of the term is clipped), e.g.: *monocotyledon – monocot, laboratory – lab, advertisement – ad, gasoline – gas, etc.*

Fore-clipped morphological variants of the terms (when the final part of the term is retained) are also frequently applied in the field of ecology, e.g.: *raccoon – coon, alligator – gator, seedcase – case, earthquake – quake.*

This term formation pattern is not widespread in the Latvian language. The author of the present research has encountered only one example of the clipped terms in synonymy strings in special texts, e.g. *ūdensplūdi – plūdi.*

- **Shortened form of the name** - is a reduced expression, which may take forms of abbreviations, is coined omitting one of the constituent elements or is represented as metaphorically syntactical variants. Taking into account the global tendencies for the compression of information, the short lexical variants are becoming more

and more widespread, as “...a short word is always better than a long one, if it carries your meaning equally well...” (Rankin, 2009; 94). The shortened lexical variants may take form of:

- **Morphologically syntactical variants** – synonymous terms created on the basis of conversion simultaneously omitting one of the constituent elements. Change of a part of speech provokes alterations of the morphological paradigm and influences syntactic functions. Conversion could influence only syntactic functions of the lexical item, if the latter does not change its form and simply acts as another part of speech. The following examples in the English language and the corresponding equivalents in the Latvian language illustrate this phenomenon: *whaler boat* (*vaļu medību laiva*) – *whaler* (*valzivju medību kuģis*); *saline soil* (*sāļaina grunts*) – *saline* (*sāļezers*); *monocropping system* (*vienas šķirnes laukkopība*) – *monocropping* (*vienas šķirnes laukkopība*). It can be clearly seen that the terms formed on the basis of conversion (although denoting one and the same scientific concept) may encounter different translation equivalents in the Latvian language. In the Latvian language the phenomenon of conversion is not widespread (cf, Veisbergs 2001: 130), therefore, there are not so many examples of morphologically syntactic variants, e.g.: *zaļās kustības atbalstītājs* (*green movement supporter*) – *zaļais* (*green*).
- **Canonical form of the name** – is a reduced expression, in which some of the constituent elements are omitted without distorting information. Canonical forms are subject-specific and may acquire additional meanings if used in another scientific and technical domain. Canonical forms of names are created by omitting the *beginning element* (*data analysis* – *analysis*; *chemical bond* – *bond*; *corn cob* – *cob*; *leaf litter* – *litter*; *temperature lapse rate* – *lapse rate*, etc.), *middle element* (*biotic carrier potential* – *biotic potential*; *carbon dioxide tax* – *carbon tax*; *solar-*

generated energy – solar energy, etc.) or final constituent element (capillarity action – capillarity; diesel fuel – diesel; paraffin oil – paraffin, etc.). Canonical forms in the Latvian language are created by omitting the beginning element (apkārtējās vides piesārņojums – vides piesārņojums; dzīvnieku piebarošana – piebarošana; dzīvnieku pavairošana nebrīvē – pavairošana nebrīvē, etc.) or the middle constituent element (meža kvalitātes uzlabošana – meža uzlabošana; saules starojuma enerģija – saules enerģija).

- **Abbreviations** are mostly used to avoid application or repetition of the complicated names of the chemical elements and substances, e.g.: *dichlorodiphenyltrichloroethane – DDT, tetrachlorodibenzoparadioxin – TCDD, polyvinylchloride – PVC, carbon dioxide equivalent – CO₂ equivalent*. The application of the shortened forms of chemical substances and/or elements is a worldwide paradigm. The same tendency is observed in the Latvian language, e.g.: *DDT – dihlordifeniltrihloretāns, PVC – polivinilhlorīds*. Abbreviations are also used to substitute the names of various indexes, components, methods. Some of the abbreviations coincide in both languages, e.g.: *acceptable daily intake – ADI (in Latvian – pieļaujamā dienas deva – ADI), active ingredient – AI (in Latvian – aktīvais ingredients – AI), gross calorific value – GCV (in Latvian – augstākā siltumspēja – GCV)*, while others have different established forms in both languages, e.g. *biological oxygen demand – BOD (in Latvian – bioķīmiskais skābekļa patēriņš – BSP)*.

3.2.3.2. Terminography or Dictionary Variants

The development of computer sciences and the dynamics of terms in computer tools and resources, gave an impetus for the rise of a number of terminological dictionaries, (e.g. thesauri, ontologies, data banks, etc.) both printed and electronic, in

the majority of scientific technical fields. These tendencies are clearly observed in the thematic field “environment and ecology”, since it is one of the dynamically developing today. The variety of terminology banks include many terms from fields closely related to ecology, such as agronomy, genetics, forestry, aquafarming, etc, because of their wide application. The dictionary entries often reflect the terms, which either form the core of the particular scientific discipline or are very frequently used, and may cause any difficulties for the users (experts, learners, translators). The primary emphasis of the work of compiling dictionaries is on correct usage of terms in the oral or written speech acts.

The problem of varying approach to writing some of the terms is rather topical today, since sometimes there are as many variants of one term, as there are users, who apply it. Private judgements on what term variant to use, if based on sound linguistic principles, inevitably lead to lack of consistency in the applications of the particular term. Such inconsistency in term usage is typical of bilingual or even multilingual dictionaries compiled by the experts of the source language (whose mother tongue it is), who have formal linguistic training, but do not know much about the organizing principles (semantic, pragmatic, stylistic, etc.) of the target language (foreign language). The applied variants require a considerable time to be examined and tested, meanwhile, the existence of different forms of one and the same term should not cause any difficulties in the communication process, unless the consistency principle is ignored. The awareness of the existing variants helps users to delineate the most suitable one.

The existing terminographic or dictionary variants can be briefly subdivided into orthographic (graphical and phonetically graphical) and syntactic variants.

Orthographic variants represent different spelling of one and the same lexical item. They are divided into graphical variants, which differ in writing (in one word, hyphenated, separately) and phonetically graphical variants, which differ in spelling.

- **Graphical variants** exist for a large selection of compounds in the English language. Very often solid compounds are written as open compounds, e.g.: *bottomland* – *bottom land*; *earthflow* – *earth flow*; *tallgrass* – *tall grass*. Solid compounds could also take the form of hyphenated compounds, e.g.: *upland* – *upland*, *ecoaudit* – *eco-audit*. Hyphenated compounds may become open compounds, e.g.: *long-grass prairie* – *long grass prairie*; *wood-burning stove* – *wood burning stove*; *cross-compliance* – *cross compliance*. Open compounds become hyphenated compounds, e.g.: *full cost accounting* – *full-cost accounting*. Graphical variations of terms in the English language do not influence the choice of the corresponding equivalents as well as their writing in the Latvian language. Graphical variations of the terms are not extensively applied in the Latvian language.
- **Phonetically graphical variations** are typical of the terms borrowed from other languages. As texts in the field of environment and ecology contain quite a large number of various internationalisms, there are many phonetically graphical variant pairs, e.g.: *fiord* – *fjord*; *feldspar* – *feldspath*; *savanna* – *savannah*; *doline* – *dolina*; *artifact* – *artefact*; *sulphur cycle* – *sulfur cycle*; *foehn* – *föhn*, etc. The Latvian language contains also grammatical variants of the one and the same term, which mostly concern differences in gender, e.g.: *triece* / *triecis* – *ram pump*.

Syntactic variants of the term appear mostly due to alterations in the order of elements within the complex terminological unit. These changes involve the application of the supportive surface elements required to express the same essential meaning, i.e. prepositions and junctions (rarely). The most popularly used are the preposition *of*, e.g.: *soil erosion* – *erosion of soil*, *wind power* – *power of wind*; preposition *by*, e.g.: *wave-generated energy* – *energy generated by wave*; preposition *in*, e.g. *boreal region forest* – *forest in boreal region*; preposition *under*, e.g. *forest regeneration* – *forest under regeneration*. The fluctuations of the form in the English language do not influence the choice of the equivalents in the Latvian language, when applying the preposition *of*, as both of the variants in Latvian are expressed by using

the genitive form, e.g.: *soil erosion – erosion of soil – augsnes erozija*. Changes appear using the prepositions *in* and *under*, as the application of preposition *in* calls for the locative form, e.g.: *boreal region forest – boreālā reģiona mežs – forest in boreal region – mežs boreālajā reģionā*, while the use of preposition *under* changes the whole phrase lexically and grammatically – *forest regeneration – meža atjaunošana; forest under regeneration – mežs atjaunošanas stadijā*.

The inclusion of the particular lexical items in the certain dictionaries does not necessarily mean, that the authors approve only those terms, but it means, that they recommend the following variant of the particular term. Some sources provide different variants of a term in order to help users appreciate better the similarities and differences between the provided alternatives. The frequency rate, as well as the rate of relative acceptability of the existing variants could help us resolve the problems. The precision in the use of terms, uniformity in application among terminologists and experts in environment-related sciences as well as related scientific technical fields, are absolutely important for the further development of terminology and the growth of particular scientific discipline.

3.3. Semantic Shifts

3.3.1. Metaphorical Terms

The term ‘*metaphor*’ does occur in ISO/TC 37/SC1/CD 704.2N 133 95 EN. It is defined as “...*a term formation method in interdisciplinary borrowing, i.e. in interdisciplinary borrowing, a word from general language or a term from another subject field is borrowed and assigned a new concept...*” (Temmerman 2000: 164).

In the scientific and technical texts metaphors can appear, for instance when the meaning of the polysemous words of the general language is extended, in order to designate a concept in the special language (Table 8).

Table 8

Metaphorical Terms

Term in English	Description	Term in Latvian
Destroying angel	poisonous mushroom	baltā mušmire
Boy's love	wormwood	vērmele
Bird of prey	bird that kills and eats other birds or small animals	plēsīgs putns
Bull's foot	coltsfoot	parastā mällēpe
Wait-a-bit	bur	Dadzis
Fair game	legal hunting	legālas medības
Archangel fir	pine tree	Priede
Chocolate mousse	a viscous, stable water-in-oil emulsion, oil-slick	naftas kārtiņa
Cloverleaf	multi-level junction in the form of cloverleaf	Ābeļzieds krustojums
Emissions trading	The system of one country using some of another country's permitted emission amount as well as its own, as a result of the rule that any new source of pollution must be offset by the reduction of pollution from existing resources	Emisijas kvotu tirdzniecība
Enemy-free space	An area into which a prey can escape from a predator, especially where two species of prey live in the same environment	-
Forest floor	The ground at the base of the trees in the forest	Meža augsne

Night soil	Human excreta collected and used for fertiliser in some parts of the world	Atkritumi (kurus izved naktī)
Trade wind	A wind that blows towards the equator, from the north-east in the northern hemisphere and from the south-east in the southern hemisphere	Pasāts
Hands-on approach	An approach demanding active actions	Praktiskā pieeja
King head	ambrosia, richweed	Bišu maize
Tragedy of the commons	a type of social trap, often economic, that involves a conflict over resources	“Ganību tragēdija”
Dust veil	A mass of dust in the atmosphere created by volcanic eruptions, storms and burning fossil fuels, which cuts off solar radiation and so reduces the temperature of the Earth’s surface.	Putekļu kārtā
Ecowarrior	A activist who is prepared to take direct, sometimes illegal, action on environment issues rather than just campaign	Ekocīnītājs
Gene pool	The total amount of genetic material within a freely interbreeding population at a given time	Genofonds

The purpose of using metaphors in the source text is to designate an object and express a concept comprehensively and concisely. According to I.A. Richards (1936), a metaphor consists of two parts, the *tenor* and *vehicle*. The *tenor* is the term to which attributes are ascribed and the *vehicle* is the term from which attributes are borrowed. The properties of the *vehicle* which apply to the *tenor* in a given metaphor are named

grounds of a metaphor, also known as the *sense* of a metaphor. P. Newmark (1988a) applies the terms *object* and *image* respectively to denote the same phenomena.

When translating metaphorical terms from the source text into the target language, it is not always possible to express the original idea in the same concise and precise form. Therefore, in the majority of cases metaphorical terms stop being metaphors in the target text, as it is not always possible to achieve equivalence not only at the word level, but, which is more important, above the word level. It means that anyway translator should decide “...which of the relevant features in the ST it is most important to respect, and which can most legitimately be sacrificed...” (Hervey et al, 1995: 17).

Most of the above mentioned metaphorical terms have no direct equivalents in the Latvian language and, thus, are not registered in dictionaries (especially in the printed sources, which are slowly upgraded). Translators use the literal approach instead of choosing the appropriate stylistic devices and linguistic means in order to express the exact meaning of metaphorical terms.

The translator, in his/her turn, may experience additional difficulties, when trying to find the precise equivalents in the target language, because very often the link between the metaphorical term (coined by using the sources of general language) and its target equivalent is hidden or absent (cf. Platonova 2008) (Figure 4.).

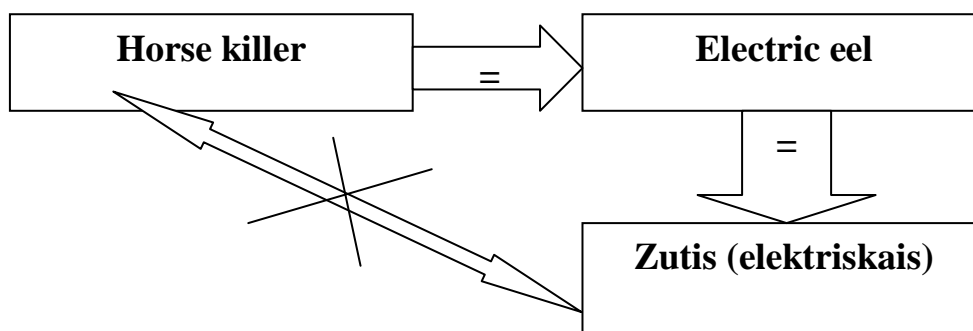


Figure 4. The link between metaphorical and non-metaphorical terms

The source term *electric eel* has a complete context-dependent synonymous form *horse killer*, which is recognizable in the real authentic texts and real communication in the source language (English), but the link between the target equivalent term in Latvian, i.e. *zutis (elektriskais)*, and the metaphorical source language term, i.e. *horse killer*, is not established in the respective bilingual electronic and/or printed dictionaries, glossaries and ontologies. This fact makes the process of translation extremely difficult, as the correct transfer of the semantic meaning is a vital, if not a decisive factor in the translation of scientific and technical texts.

3.3.2. Colour –Based Metaphorical Terms

Most of inexperienced translators face many difficulties when working with scientific and technical texts, that is why they choose to translate the terms word-for-word. However, the application of this approach may cause even additional difficulties, especially when dealing with colour-based metaphorical terminology in scientific and technical texts (Table 9).

Table 9

Colour-Based Terms

Colour-based term	Description	Term in Latvian
<u>Red</u> tide	Sudden, unexplained increase in numbers of toxic organisms in the sea which cause fish and shellfish feeding on them to become toxic.	<u>sarkanie</u> uzplūdi
<u>Green</u> tide	A proliferation of a marine green plankton toxic and often fatal to fish, perhaps stimulated by the addition of nutrients	<u>zaļie</u> uzplūdi <u>zaļais</u> paisums
<u>Blue</u> tide	Accumulation of the poisonous waterweed of the blue colour	<u>zilie</u> uzplūdi
<u>Black</u> tide	Accumulation of the poisonous waterweed of the black colour	<u>melnie</u> uzplūdi
<u>Blackdamp</u>	a mixture of unbreathable gases formed when oxygen is removed from an enclosed atmosphere	smacējoša gāze

	and largely replaced by nitrogen, argon, carbon dioxide and water vapour.	
<u>Black earth</u>	A dark fertile soil, rich in organic matter, found in the temperate grass-covered plains of Russia and North and South America.	<u>Melnzeme</u>
<u>Blackheart</u>	A non-parasitic disease of plants, as of potatoes and various trees, in which internal plant tissues blacken, usually as a result of extremes in temperature	<u>Brūnais kodols</u>
<u>Black-lead</u> <u>Black-chalk</u>	Graphite	Grafiti
<u>Blacktop</u>	A bituminous mixture used for paving, e.g. roads	Asfalts
<u>Blue-green alga</u>	A bacterium of a large group that carry out photosynthesis	<u>Zili zaļās aļģes</u>
<u>Brown earth</u>	Good fertile soil, slightly acid and containing humus	<u>Brūnzeme</u>
<u>Brownfield site</u>	A development site that is in town and formerly had buildings on it, preferred for building development to open fields	<u>Rūpnieciskās teritorijas</u>
<u>Brown fumes</u> <u>Brown smoke</u>	Fumes from tarry substances produced by coal burning at low temperatures	-
<u>Brownlands</u>	Areas of land for development that have been previously developed but are currently unused	Pamestās zemes
<u>Green belt</u>	Green zone in or around the city	<u>Zaļa josla, apzaļumota teritorija</u>
<u>Green accounting</u>	Environmental and natural resource accounting	<u>zaļā uzskaitē</u>
<u>Green chemistry</u>	The development of chemical products that do not cause pollution or environmental or human health risks	<u>Zaļa ķīmija</u>

<u>Green consumerism</u>	A movement to encourage people to buy food and other products such as organic foods or lead-free petrol which are regarded as environmentally good	-
<u>Greenfield site</u>	A place in the countryside, not previously built on, that is chosen as the site for a new housing development or factory	<u>Neskartās teritorijas</u>
<u>Greenhouse</u>	A structure made of glass inside which plants are grown	siltumnīca
<u>Green manure</u>	A herbaceous plant material, which is plowed into the soil while still green	<u>Zaļais mēslojums</u>
<u>Green petrol</u>	A type of petrol containing fewer pollutants than ordinary petrol	videi draudzīga degviela
<u>Green politics</u>	The kind of political proposals put forward by environmentalists	Videi draudzīga politika
<u>Green pricing</u>	The choice offered to customers of energy companies to pay extra on their bills to cover the costs of researching and using renewable resources	Videi draudzīga enerģijas cenu veidošana
<u>Green space</u>	An area of land which has not been built on, containing grass, plants and trees	<u>Zaļā zona</u>
<u>Greenwash</u>	A public relations initiative such as advertising or public consultation, that is designed to show the concern of a business or organization for the environmental impact of its activities but which is often regarded as propaganda	<u>Zaļmazgāties, pūt zaļas pīlītes</u>
<u>Green waste</u>	Leaves, grass cuttings and other plant material that is to be disposed of	<u>Zaļie atkritumi</u>
<u>Grey dune</u>	Fixed, stable sand dunes located 50-100 m from the edge of the ocean.	<u>Pelēkā kāpa</u>
<u>Grey water</u>	The relatively clean waste water from sinks, baths and kitchen appliances	Mājsaimniecības notekūdeņi
<u>Redwood</u>	A coniferous tree noted for its great height	<u>Mūžzaļā sekvoja</u>
<u>Red snake</u>	Floating guard boom, slick bar, oil boom	<u>ragata (peldošs aizžogojums)</u>
<u>Redberry</u>	Small spiny evergreen shrub with minute flowers and red berries	<u>žņšens</u>

The application of the word-for-word translation approach is very often justified when metaphorical terms are coined by analogy with the initial term (red, green, black, blue *tide*). It facilitates the application of the terms, makes it unambiguous and understandable for experts from various language communities and even helps us standardize and unify terminology in the respective field.

Colour-based metaphorical terms are very extensively used in both the English and Latvian languages. Colours are the indicators of a person's perception of the world; they can be easily associated with certain emotions they cause (black – sorrow, red – emergency, green – safe, white – pure, etc.). However, in various cultures they can cause different reactions, as some cultures can even lack some shades of colours or even particular colours (cf. Nītina, Iljinska, Platonova, 2008: 182-186).

Thus, in order to standardize and free them of cultural bounds, the so-called basic colours, chosen by B. Berlin and P. Kay (1999: 3) are applied for the creation of the terms: *balts* – **white**, *melns* – **black**, *sarkans* – **red**, *zaļš* – **green**, *dzeltens* – **yellow**, *zils* – **blue**, *brūns* – **brown**, *pelēks* – **grey**, *purpurs* – **purple**, *rozā* – **pink** un *oranžs* – **orange**. Colour names are used, as they can illustrate the nuances of the particular meaning in a language.

In the environment-related fields a variety of terms is coined using the colour names in Greek and Latin. A large number of the names of the elements of flora and fauna, as well as chemical substances and minerals are coined following this pattern (Table 10).

Table 10

Colour Terms of Greek and Latin Origin

Greek	Latin	Meaning in English	Example	Translation into Latvian
<i>coccino-</i> , <i>erythro-</i> , <i>rhodo-</i> , <i>eo-</i> ;	<i>purpureo-</i> , <i>rubri-</i> , <i>rufi-</i> , <i>rutuli-</i> , <i>rossi-</i> , <i>roseo-</i> , <i>flammeo-</i>	Reds of various shades (including pink)	Rhododendron Flame tetra	Rododendrs Sarkanā tetra

<i>chryso-;</i> <i>cirrho-;</i>	<i>aureo-, flavo-, fulvi-</i>	Orange, also gold	Chrysolophus Flavobacteria	Zeltā fazāns Flavobakterijas
<i>xantho-;</i> <i>ochreo-;</i>	<i>fusci-, luteo-</i>	yellow	Xanthopuccine Luteolin	- Luteīns
<i>chloro-;</i>	<i>prasini-, viridi-</i>	green	Chlorophyll Viridity	Hlorofīls Zaļums
<i>cyano-, iodo-;</i>	<i>ceruleo-, violaceo-</i>	blue	Cyanobacteria Cerulean	Zili zaļas aļģes Debeszīls
<i>porphyro-;</i>	<i>puniceo-, purpureo-</i>	violet	Porphyrite Purpurin	Porfirīts Purpurīns
<i>albus-;</i>	<i>albo-, argenti-</i>	white	Albino	Albīns
<i>melano-;</i>	<i>nigri-</i>	black	Melanin Nigritude	Melanīns Melnums

Precise translation of metaphorical or metonymic colour-based terms is a very sophisticated task, which can be accomplished successfully only if the translator constantly improves his/her professional knowledge and linguistic skills, as well as pragmatic competence.

3.3.3. Metonymic Terms

Metonymy is often considered to be one type of a metaphor, as they both describe connection between two things where one term is substituted for another. Some scholars (e.g. Searle, 1969/1993; Eco 1984) even suggest to broaden the definition of the metaphor including metonymy as a special subtype, as it is often difficult to define whether the particular linguistic instance is metonymic or metaphoric. Therefore G. Radden (2000, 215) even introduces the notion of the metonymy-based metaphor, which should solve a significant part of the present problem. The metonymy-based metaphor is defined as “...a mapping involving two

conceptual domains which are grounded in, or can be traced back to, one conceptual domain...”, e.g. *autumn colour* – the leaves on the trees of the red and yellow colours.

Other linguists (Bredin, 1968; Jakobson, 1971) hold the opposite view, as they emphasize that the metaphor and metonymy are generated by following the distinct principles. Metonymy represents “...*simple contiguous relation between objects, such as part-whole, cause-effect, and so on...*” (Gibbs Jr. 1998:258 in A. Ortony 1998), while metaphor is based on similarity. According to R.W. Gibbs Jr. (1993, 252 – 76), to create a metaphor two conceptual domains are used, where one is understood in the terms of the other. Metonymy involves only one conceptual domain in that the mapping or connection between two things is done within the same domain.

There are various metonymic models, which have been analysed and classified by many prominent linguists (e.g., Lakoff and Johnson 1980, Turner 1994, Radden 2000). These metonymic models can be based on a variety of conceptual relations, e.g.: *whole for the part* (e.g. institution – for its members), *part for the whole* (fruit for the fruit tree, e.g. *apple-growing area*; *fullmouth* – adult animal), *object used for user* (e.g. *backpacks* for the tourists), effect for cause (*long-day plant, short-day plant*).

In comparison to metaphorical terms, the phenomenon of metonymy is not a very typical pattern of term creation in the thematic field under discussion.

3.3.4. Terms Created by Analogy

Application of analogy as a pattern for new words creation has a long tradition. According to E. Sapir (1921, 37) new words “...*are being constantly created ... on the analogy of old ones...*”. O. Jespersen (1924, 19) also analyses words and sentences, which are “...*made after the same pattern...*”. Analogy is based on similarity between words.

A variety of terms is created by analogy with other existing terms. One of the topical lexical items, which illustrates this phenomenon is the term *bank*. According to A. Veisbergs (2001, 108) this word “...has developed a more general meaning of a place for storing anything for future use through coining of many new terms...”, e.g. *gene bank* (*gēnu banka*), *cloud bank* (*zems padebasis*), *bottle bank* (*stikla taras pieņemšanas punkts*), *fog bank* (*mīklas dūmaka virs jūras*), *earthen bank* (*zemes uzbērums*), *stone bank* (*akmeņu uzbērums*).

There are also many terms, which are created on the basis of the word *pyramid*, meaning *a system or structure resembling a pyramid, as in hierarchical form*, e.g. *ecological pyramid* (*ekoloģiskā piramīda*), *population pyramid* (*demogrāfiskā piramīda*), *food pyramid* (*uztura piramīda*), *biomass pyramid* (*biomasas piramīda*), *energy pyramid* (*enerģijas piramīda*).

Another category of the terms is created by analogy with the word *zone*, i.e. *any continuous tract or area that differs in some respect, or is distinguished for some purpose, from adjoining tracts or areas*, e.g. *gliding zone* (*slīdes zona*), *vadose zone* (*vadozā zona*), *buffer zone* (*buferzona*), *abyssal zone* (*dziļjūras zona*), *intertidal zone* (*plūdmaiņu zona*).

Analogy as a pattern for new term formation is applied for the sake of clarity and because it facilitates the introduction, understanding and application of the novel terms.

3.3.5. Terms based on Allusion

The notion of allusion has been actively discussed by many prominent linguists, e.g. Grice, 1975; Hebel, 1991; Lennon, 2004. Allusion is “...a passing reference, without explicit identification, to a literary or historical person, place, or event, or to another literary work or passage...” (M.H. Abrams and G.G. Harpham 2009: 11).

The motivation for applying allusion is hidden in its ability to create a desired mental image for the readership of the text, establishing clear relations between the denotative (general) meaning of the lexical item and a concept in the scientific discipline it should denote. However, allusion “...allows the writer to coin expressions which can only be fully understood against the background of the target of the allusion...” (Lennon, 2004, 238). This is particularly important for the allusions applied for the needs of communication for special purposes. The thematic field “environment and ecology” contains a variety of terms created on the basis of this pattern. Allusion as a term formation pattern is justified and successful if the readers recognise an implicature and, thus, can easily recognise special meaning expressed with the help of general knowledge. Allusion, as a marker of implicature “...functions within the intertextual or inter-contextual domain as an additional contribution to the semantic value of the alluding unit in the ... text, enabling the writer to mean more or other than he or she says...” (Lennon, 2004, 239).

The nature and relevance of the allusion are not explained by the author of the text, who relies on the readers’ awareness of what is expressed. This stylistic technique is an economical means of evoking certain associations and creating a particular mental image that the source and target audience are supposed to be familiar with. Therefore, to serve these needs, allusions may assume several forms, one of them being the form of metaphorical references (cf. J.A. Cuddon 1991, 29). The following examples of the terms coined on the basis of allusion (hidden/obvious similarity of one or many components) are considered to illustrate this phenomenon (Table 11).

Table 11

Terms Based on Allusion

Cloud forest	A tropical forest growing at high altitude that is usually covered by cloud	Lietus mežs Miglas mežs
Dust devil	A rapidly turning column of air which picks up sand over a desert or beach, and things such as dust, leaves and litter elsewhere	Putekļu vētra

Blood rain	coloured dust rain, dust fall	Putekļu nokrišņi
Mediterranean terrace	a series of level or virtually level strips running across the slope at vertical intervals, supported by steep banks or risers	Kāpniskā terase Kāplaina terase
Elfin forest	The zone of stunted wind-blown trees growing at high attitudes just above the timberline on tropical mountains	Pundurmežs

The term *cloud forest* has been quite successfully used in many literary works, e.g. *King of the Cloud Forests* (M. Morpurgo, 1987). The notion of cloud forest originally comes from the Spanish language, as this type of forest is especially characteristic of Central and South America. The term *elfin forest* evokes a clear mental image of the fairy world and can be found in many fairy tales, legends, myths, and is actively used as the scene for many children computer games.

The term *Mediterranean terrace* implies a clear image of various types of the bench terraces (both in the landscape designs and urban buildings), characteristic of the Mediterranean Sea region. The term *blood rain* has been already mentioned by Homer in the Iliad – “...but he shed blood rain down upon the ground...” (the Iliad in translation of I. Johnstone, 2007, 355) and then very frequently used by other ancient philosophers and writers (e.g. Plutarch, Livy, Pliny). This term was also employed by Geoffrey of Monmouth in the 12th century, who popularized the legends of King Arthur, as well as by William of Newburgh (the contemporary chronicler of Richard the Lionheart).

The whirlwinds, or *dust devils*, can be frequently observed in different Muslim countries (Saudi Arabia, Kuwait, Iran, Jordan, etc.) with dry climate, where this phenomenon is known as *djinn* (English – *genie*), as it looks like a vertically oriented rotating column, imitating the appearance of genies from the magic lamps.

This stylistic pattern is quite frequently used in the English language (less in the Latvian language) to coin novel terms, and, if applied, it significantly contributes to the stylistic enrichment of the text. However, these terms rarely preserve their allusive (metaphorical) nature when translated into other languages, as the translators transfer the meanings of terms (concepts), not their forms.

3.4. Hyponyms / Hyperonyms

The context determines the shades of meanings of terms, which are either polysemous and belong to various domains simultaneously, or are parts of the broader term (BT) – narrower term (NT) semantic relations, where the broader term, for instance, is of Greek or Latin origin and can be used instead of all narrow term meanings, unless they are specified.

For instance, when translating different types of stone fruits of the genus *prunus*, the authors of the source texts do not frequently specify the subgenus, and, as the result of this, the majority of amateur translators prefer to translate the term as *plum – plūme*, rather than to search for the more precise and correct variant. In a great number of authentic special sources written in English, Latvian, German and Russian the subgenus (*prunus – plum*, *cerasus – cherry*, *armeniaca – apricot*, *amygdalus – almond*, *persica – peach*, etc) is specified to facilitate the understanding and translation of the term (Table 12).

Table 12

Translation of the BT and NT Variations of the Genus *Prunus*

Term in Latin	Term in English	Term in Latvian
<i>Prunus cerasus</i>	Sour cherry	skābais ķirsis
<i>Prunus serrulata var. Spontanea (cerasus)</i>	oriental cherry, Japanese cherry	Sīkzobainais kalnu ķirsis, Sakura

<i>Prunus cerasifera</i>	Cherry plum	Kaukāza plūme
	Myrobalan (plum)	Ķiršveida plūme
<i>Prunus salicina</i> Lindl.; syn. <i>Prunus triflora</i> or <i>Prunus thibetica</i> ;	Japanese plum (sumomo – Japanese)	diploīdā plūme
<i>Prunus padus</i> , <i>Padus avium</i>	Bird-cherry tree	Parastā ieva
<i>Prunus japonica</i> , <i>cerasus japonica</i>	Korean cherry	Japānas ķirsis
<i>Prunus armeniaca</i>	Apricot, "Armenian plum"	parastā aprikoze
<i>Prunus mume</i>	Japanese apricot	Japānas aprikoze
	Ume (Japanese), Asian plum	No equivalent

Therefore, in order to make translation of the names of trees of Latin and Greek origin into different languages possible, the authors of texts (urban landscaping experts, biologists, terminologists, environmental problems researchers, etc) should always emphasize the difference among various subgenera of the same genus. It should be noted that a variety of terms of the environment-related field come from other non-European languages, but still the names of the trees can be understood, as the types of trees can be distinguished and translated mainly through Latin or Greek.

3.5. Polysemy

The rapid extension of the scientific innovations and appearance of novel technological inventions contribute to the horizontal or vertical expansion of the lexis in a language.

In the case of horizontal expansion of lexis, new word and term forms appear and take their places in the system. If the expansion is taking place on the vertical

scale, then no new word forms are introduced in the language, but the system of the meanings of the already existing words changes: narrows or expands. The latter leads to creation of polysemous terms.

The term polysemy is coined by M. Breal (1897: 154-5), who distinguished various types of it, based on the types of semantic relations between the old meaning and the new one. In spite of a great number of studies of this phenomenon, traditionally „...polysemy was regarded as the unusual case, with monosemy and homonymy being regarded as the norm...” (Cuyckens, Zawada 2001: xii). However, some linguists (Ullmann 1951/1957: 117), suggested that “...the fact that some words have a network of multiple but related meanings is the pivot of semantic analysis...”.

Modern linguists (Cowie 1982, Lipka 1990, Gibbs 1994, Cruse 2000, Pustejovsky 1995, Nerlich 2003, Clark 2003) share this opinion and believe that polysemy is a very topical phenomenon and thus demands a thorough analysis “...since monosemy and homonymy are endpoints of a continuum, polysemy, as the middle, should be the most frequent case...” (cf. Tuggy 1999: 357). They consider polysemy to be a graded phenomenon, which can be of two types, i.e. contrastive polysemy (i.e. homonymy) and complementary polysemy (interrelated semantic aspects).

Polysemy gives rise to the problem of lexical ambiguity, therefore, context is extremely important in determining the meaning of the polysemous term.

The present thematic field “environment and ecology” can be characterised by a large number of polysemous terms, which act as terms in the related semantic fields/subfields or groups (intra-field polysemy) or are used to denote scientific phenomena in the distinct thematic fields (external polysemy).

Since the present thematic field includes so many reciprocally related semantic fields/subfields, the number of terms based on intra-field polysemy within it is quite impressive.

1. **Cloud:**

- *Climatology*: a visible collection of particles of water or ice suspended in the air, usually at an elevation above the earth's surface;
- *atmosphere*: any similar mass, esp. of smoke or dust;
- *environment*: a great number of insects, birds, etc., flying together: a cloud of locusts obscuring the sun.

Both printed and electronic dictionaries provide the following equivalents: *mākonis, aizsegs, duļķes, duļķojums*.

2. **bud:**

- *botany*: a small axillary or terminal protuberance on a plant, containing rudimentary foliage (leaf bud), the rudimentary inflorescence (flower bud), or both (mixed bud);
- *zoology*: (in certain animals of low organization) a prominence that develops into a new individual, sometimes permanently attached to the parent and sometimes becoming detached;
- *mycology*: a small, rounded outgrowth produced from a fungus spore or cell by a process of asexual reproduction, eventually separating from the parent cell as a new individual: commonly produced by yeast and a few other fungi.

The translation variants for the present source language term are the following: *pumpurs, ziedpumpurs, dīglis, kārpiņa*.

There is also a variety of terms, which are created based on external polysemy, i.e. the meanings of terms from other scientific disciplines have extended.

3. **Rose**

- *jewellery* - an obsolete gem style or cut, flat on the bottom and having an upper side with from 12, or fewer, to 32 triangular facets;
- *mathematics* - a plane polar curve consisting of three or more equal loops that meet at the origin. equation: $r = a \sin(n\theta)$ or $r = a \cos(n\theta)$;
- *electrical engineering* - a circular boss attached to a ceiling through which the flexible lead of an electric-light fitting passes;

- *biology* - any of a genus (*Rosa* of the family Rosaceae, the rose family) of usually prickly shrubs with pinnate leaves and showy flowers;
- *climatology* - a diagram with radiating lines showing the frequency and strength of winds from each direction affecting a specific place, also known as wind rose.

The translation variants for the present source language term are the following: *briolete (rozēs griezumš), rozete, roze, n-lapu roze, vēju roze.*

4. **Blade**

- *medicine* - a broad flat body part (as the shoulder blade);
- *phonetics* - the foremost and most readily flexible portion of the tongue, including the tip and implying the upper and lower surfaces and edges.
- *botany* - the broad part of a leaf, as distinguished from the stalk or petiole;
- *archaeology* - a long thin flake of flint, possibly used as a tool
- *machinery* - a vane or bucket of a waterwheel, paddle wheel, water turbine, or the like.

Both printed and electronic dictionaries provide the following equivalents: *asmens, lapa, stiebrs, mēles priekšējā daļa, metējkauss, lāpstiņa.*

Polysemous terms may also be coined by adopting the words from the general language, which are used as the elements of metaphors, constituents of other terminological expressions or are applied solely, e.g. *water-table* – *ūdenslīmenis*; *chain of mountains* – *kalnu ķēde*; *anti-erosion belt* – *preterozijas meža josla*; *needle* – *kalna virsotne*; *bed* – *upes gultne*; *bedrock* - *cilmiežis*.

The more frequently applied type of complementary polysemy is metaphoric polysemy, which “...derives in most cases from metaphor as a diachronic process...” (A. Blank in Nerlich B. et al 2003: 268). It is based on the apparent/obvious or obscure/hidden, but still well-known and understandable similarity between two concepts that belong to different conceptual domains (semantic fields) (Table 13).

Table 13

Polysemous Faunal Terms

<i>Term</i>	<i>Faunal meaning</i>	<i>Special meaning</i>	<i>Latvian Equivalent</i>
<i>Beaver</i>	A large aquatic rodent of the genus <i>Castor</i> , having thick brown fur, webbed hind feet, a broad flat tail, and sharp incisors adapted for gnawing bark, felling trees, and constructing dams and underwater lodges.	A piece of armor attached to a helmet or breastplate to protect the mouth and chin.	<i>Sejsegs</i>
<i>Camel</i>	A humped, long-necked ruminant mammal of the genus <i>Camelus</i> , domesticated in Old World desert regions as a beast of burden and as a source of wool, milk, and meat.	A device used to raise sunken objects, consisting of a hollow structure that is submerged, attached tightly to the object, and pumped free of water. Also called caisson.	<i>Kesons</i>
<i>Elephant</i>	A very large herbivorous mammal, having thick, almost hairless skin, a long, flexible, prehensile trunk, upper incisors forming long curved tusks of ivory, and, in the African species, large fan-shaped ears.	An institutional investor that controls a substantial amount of funds and that makes investment decisions that can have a major impact on a security's market price.	<i>Liels investors</i>
<i>Bee</i>	any hymenopterous insect of the superfamily Apoidea, including social and solitary species of several families, as the bumblebees, honeybees, etc.	a community social gathering in order to perform some task, engage in a contest, etc.	<i>Talka</i>
<i>Frog</i>	any tailless, stout-bodied amphibian of the order Anura, including the smooth, moist-skinned frog species that live in a damp or semi-aquatic habitat and the warty, drier-skinned toad species that are mostly terrestrial as adults.	Railroads. a device at the intersection of two tracks to permit the wheels and flanges on one track to cross or branch from the other.	<i>Pārmijas krustenis</i>

Mouse	any of numerous small Old World rodents of the family Muridae, esp. of the genus Mus, introduced widely in other parts of the world.	Computers. a palm-sized, button-operated device that can be slid on wheels or ball bearings over a desktop to move the cursor on a CRT to any position, or slid over a drawing in order to recreate the drawing on a CRT.	<i>Pele</i>
Monkey	any mammal of the order Primates, including the guenons, macaques, langurs, and capuchins, but excluding humans, the anthropoid apes, and, usually, the tarsier and prosimians.	Any of various mechanical devices, as the ram of a pile driver	<i>Zveltņis</i>
Dog	any carnivore of the dogfamily Canidae, having prominent canine teeth and, in the wild state, a long and slender muzzle, a deep-chested muscular body, a bushy tail, and large, erect ears.	Machinery: any of various mechanical devices, as for gripping or holding something	<i>aizturis, sprostpielējums, aizturpielējums</i>
Cat	a small domesticated carnivore, <i>Felis domestica</i> or <i>F. catus</i> , bred in a number of varieties.	A device for raising an anchor to the cathead.	-
shark	any of a group of elongate elasmobranch, mostly marine fishes, certain species of which are large, voracious, and sometimes dangerous to humans.	An investor or firm that is hostile to the target firm's management and that is interested in taking over the firm.	<i>Haizivs</i>
bull	the male of a bovine animal, esp. of the genus <i>Bos</i> , with sexual organs intact and capable of reproduction.	An investor who believes the price of a particular security or security prices in general will follow a broad upward trend. An investor can often be a bull on a specific security but not on the general market, and vice versa.	<i>Bullis</i>

Aligator	either of two broad-snouted crocodilians of the genus Alligator, of the southeastern U.S. and eastern China.	A tool or fastener having strong, adjustable, often toothed jaws. Mechanics: Any machine with strong jaws, one of which opens like the movable jaw of an alligator.	<i>Knaibles</i>
bear	any of the plantigrade, carnivorous or omnivorous mammals of the family Ursidae, having massive bodies, coarse heavy fur, relatively short limbs, and almost rudimentary tails.	An investor who believes a security or some other asset or the security markets in general will follow a broad downward path. An investor can often be a bear on a particular security but not on the general market and vice versa.	<i>Lācis</i>
Butterfly	any of numerous diurnal insects of the order Lepidoptera, characterized by clubbed antennae, a slender body, and large, broad, often conspicuously marked wings.	Sculpture: an X-shaped support attached to an armature	<i>Tauriņveida balsts</i>

The terms collected in the above mentioned table are faunal metaphorical references, which are created based on the similarity in weight, function, outlook; and evoke certain associations, with which the author and the readers are both familiar. Some of the examples mentioned above lack corresponding equivalents in the Latvian language, due to the fact that there is no precisely established link between the metaphorical term, used to denote a scientific concept in the English language, and the non-metaphoric Latvian term.

Despite the fact that today translators and terminologists have a variety of software programmes and tools to deal with terms and texts containing the terms, the phenomenon of polysemy is still challenging for both. Lexical items easily acquire additional meanings, extending the range of the existing ones, which means that

polysemy, in particular complementary polysemy, on the one hand complicates the process of terminology analysis, on the other hand calls for a further investigation of the special meaning formation.

3.6. False friends

The term '*false friends*' was first introduced in 1928 by M. Koessler and J. Derocquigny in their work "*Les faux amis ou Les pièges du vocabulaire anglais*". This phenomenon is associated with the words of different languages, which are considered by the users to possess the same meanings for the reason of their graphical (in written texts) or phonological (oral speech acts) similarity. The majority of the false friends in the Latvian language are words/terms borrowed from other languages or coined using the elements of the Latin and Greek languages (cf. Baldunčiks 2005: 56 – 64). That is why these false friends have similar roots, but are completely or partially unrelated in the selected pair of the contemporary languages (cf. Veisbergs, 1994). It is significant to consider the phenomenon of the false friends when translating or performing the contrastive analysis.

It is possible to consider several categories of the false friends in the thematic field 'environment and ecology' in English and Latvian:

Monolingually it is possible to distinguish between false friends, which are:

- written alike (*homographs*) – rarely faced in the selected domain, for instance: *ounce* (unit of measure) – *ounce* (snow leopard). These terms are not false friends in the Latvian language and are translated as *unce* and *sniega leopards (barss)*. Another example concerns the following pair of terms: *scar* (mark left on the body) – *scar* (low submerged rock in the sea), with the corresponding equivalents in Latvian – *rēta* and *klints*.

- sound alike (*homophones*) – the thematic field ‘environment and ecology’ abounds in such terms. The author of the present research considers some examples of these terms just to illustrate this phenomenon and they are not to be further analysed in the frame of the present research: *assay – essay, carr – car, cattle – kettle, clod – clot, dose – doze, dy – dye, beech – beach, abeyance – abience, objection – abjection, alimentary – elementary, craft – kraft, lea – lee, leach – leech, lead – lid, leg – lek, grate – great, gray – grey, grid – grit, heap – hip, karri – curry, lay – ley, mold – molt, mor – more, neap – nip.*

However, when two languages are compared within a particular domain, it is possible to divide false friends’ pairs into the following types:

1. Monosemous in both the SL and TL, which are semantically absolutely unconnected, or partially connected (based on internationalisms, have one origin), or belong to different parts of speech, e.g.:

- Samite (E) (brokāts) – samits (L) (summit)
- Soma (E) (ķermenis/ soma) – soma (L) (soma, bag, satchel, clutch)
- Loma (E) (-) – loma (L) (character, role)
- Doze (E) (pūšana) – dozē (L) (the grammatical form of the verb *to dispense* for the third person)
- Alga (E) (aļģe) – alga (L) (salary)

2. Polysemous in both the SL and TL – just one meaning or even a shade of meaning in both terms coincides, which means that these pairs of terms are highly context-bound, e.g.:

- Mode (E) (paņēmiens, mode, veids) – mode (L) (vogue, fashion, trend)
- Aliment (E) (uzturs, pabalsts) – alimenti (L) (food, alimony)
- Slab (E) (plāksne, slābs, gabals) – slābs (L) (Noun: slab, adj.: loose, slack)
- Lode (E) (iegula, dzīsla) – lode (L) (sphere, bullet)

3. Polysemous in the SL, but monosemous in the TL – the term in the source language has many meanings, but this term is perceived only in one meaning as a false friend for the term in the target language, e.g.:

- Concurrent (E) (konkurents, neatņemama daļa) – konkurents (L) (rival, competitor)
- Terrace (E) (terase, zāliens ielas vidū) – terase (L) (terrace)

The phenomenon of false friends in the majority of cases does not present any difficulties for the experts in the respective thematic field, however, may be challenging for translators (especially inexperienced).

3.7. Loanwords: Culture-specific Terms and Internationalisms

The notion of culture is difficult to define, explain or comprehend. It denotes a compound set of various personal experiences, inherited customs, comprising the historical development of society, structure of the community, religion, language and other relevant factors. The combination of these factors makes every linguistic community a unique one; still some cultures share a certain degree of affinity/proximity, which facilitates the communication process between them, while other cultures have very few aspects in common, thus complicating the exchange of information between the sender and the receiver.

The investigation of culture and determining the approach to inter-lingual communication are of crucial importance as all information, as well as the response of the target audience to it, are culturally conditioned. According to Larson (1984: 436-7) "*...the receptor audience will decode the translation in terms of his own culture and experience, not in terms of the culture and experience of the author and audience of the original document..*". He also suggests that "*...different cultures have different focuses. Some societies are more technical and others less technical...*" (ibid: 95). These differences "*...are reflected in the amount of the vocabulary which is available to talk about a particular topic...*" (ibid: 96).

When communicating, analyzing, translating culture-specific lexical items, it is important to "*...bring back a cultural other as the same, the recognizable, even the familiar...*" (Venuti 1995: 18). The process of communicating (also translating) culture-specific elements is a very challenging task, which demands from both the sender and the receiver of the information to possess the necessary background knowledge, in order to transmit culture-bound information at the equivalent level of proficiency (professional, linguistic, etc.).

According to P. Newmark (1988b: 95-6) most cultural words are easy to detect since they are associated with a particular language and cannot be literally translated. There exist various entry terms, which are used to denote this concept. M. Baker (1992: 21), for instance, calls such elements 'culture-specific items.' C. Nord employs the term 'cultureme', which is defined as "*...a cultural phenomenon that is present in culture X but not present (in the same way) in culture Y...*" (Nord 1997: 34).

Cultural elements usually are not context-bound; they are recognized as the lexical items of the particular language. The application of cultural elements in the text, establishes a clear connection with the specific culture (customs, traditions, religion, geographic area, history, etc.) the particular terms belong to. The perception of the text containing such elements, as well as the conventions of text organization and structure vary from culture to culture, which demands from the author of the text a coherent expression and from the receiver an understanding of the content, the purpose

and intent of the text. The translator, in his/her turn, has to help the target readership to achieve these aims “...by translating with both cultures in mind...” (Larson, 1984: 436-7).

The choice of the translation method of these items is conditioned by many factors, e.g. register of communication, generic conventions, target audience, purpose of the text, role of the particular cultural element in the text, etc. Therefore, the following methods can be used:

- Transcription or transliteration (internationalisms, borrowings);
- Explanatory translation (applications of descriptive-functional equivalents);
- Replacement (when cultural elements of the SL are replaced with semantically equivalent elements of the TL);
- Omission (in the scientific technical texts terminology should not be omitted just because it is not present in the target language).

It is possible to find many TL equivalents of one and the same term, as it could be translated differently in different texts, by applying different translation methods.

It is typical of the environment-related domain to use many internationalisms, which, although are transcribed or transliterated according to the norms of the target language, are still recognizable worldwide (see Table 14). The application of loanwords makes the process of communication easier; however, some criteria of what borrowings should be accepted in the particular language have to be considered (cf. Blinkena 1997: 84).

Table 14

Examples of Internationalisms

<i>Term in English</i>	<i>Origin</i>	<i>Term in Latvian</i>	<i>Description</i>
Veld	the Afrikaans (ultimately from Dutch), literally meaning 'field'	Velda	undulating plateau grassland of South Africa
Sahel	from Arabic , <i>sahil</i> , shore, border or coast	Sāhela	the boundary zone in Africa
Simoom, samum	Arabic <i>samûn</i> from <i>samm</i> "poison"	Samums	a strong, dry, dust-laden desert wind

Paramo	American Spanish; <i>páramo</i> barren plain	Paramo	a neotropical ecosystem
Miombo	Swahili word for <i>Brachystegia</i>	Miombo	semi-arid tropical savanna or rocky area
Harmattan	from Twi <i>haramata</i> – <i>forbidden thing</i>	Harmatans	a dry dusty wind from the Sahara blowing towards the Western African coast, especially from November to March
Khamsin	from Arabic, literally: fifty	Hamsins	a hot southerly wind, varying fro m southeast to southwest, thatbl ows regularly in Egypt and over the Red Sea for about 50 days,commencing abou t the middle of March
Lagoon	from Italian <i>laguna</i> , from La tin <i>lacūna</i> pool	Lagūna	a body of water cut off from the open sea by coral reefs or sand b ars
Plankton	via German from Greek <i>planktos</i> wandering	Planktons	Small organisms that float or dri ft in great numbers in bodies of salt or fresh water
Prairie	from Old French <i>prairie</i> , Latin <i>prātum</i> meadow	Prērija	a tract of grassland; meadow

However, very often international terms are simply left in the text unchanged, i.e. in the original form, they are not transcribed or transliterated, but are complemented with a definition in order to explain the meaning this entry term is used to denote. It is characteristic of the terms, which are either untypical of the particular geographical region or represent phenomena less studied in the particular community (see Table 15).

Table 15

Examples of Internationalisms, Used in the Original Form

<i>Term in English</i>	<i>Origin</i>	<i>Term in Latvian</i>	<i>Description</i>
Campo	American Spanish, from Latin <i>campus</i> , literally meaning 'field'	-	an extensive, nearly level grassland plain in Latin America
Hammada	Arabic, <i>هَمَامَا</i> <i>ḥammāda</i>	-	Rock-strewn plateaus typical of Arabic countries

Loma	From Spanish <i>lomo</i> back, ridge	-	a hill or ridge having a broad top
Serir	Arabic/ from Berber language	-	Extensive gravel covered plains
Sertao	Portuguese: "backwoods," or "bush"	-	dry interior region of northeastern Brazil that is largely covered with caatingas (scrubby upland and forests)
Shola	from the Tamil word <i>solai</i> meaning 'thicket' or 'bamboo clump'	-	a type of high-altitude stunted evergreen forest found in southern India
Sudd	from Arabic, literally: obstruction	-	floating masses of reeds and weeds that occur on the White Nile and obstruct navigation

In the course of years or for particular needs, these terms may be represented in the target language by descriptive-functional equivalents, which, in time, gain the official status of terms and can be used alongside with their international synonyms. The following examples (Table 16) illustrate this phenomenon:

Table 16

Examples of Terms Represented by Descriptive-Functional Equivalents

<i>Term in English</i>	<i>Origin</i>	<i>Term in Latvian</i>	<i>Description</i>
Haboob	Arabic <i>habūb</i> a strong wind	Smilšu un putekļu vētra	a thick dust storm or sandstorm that blows in the deserts of North Africa and Arabia or on the plains of India.
Reef	from Middle Dutch <i>rif</i> ; related to Old Norse <i>rif</i> reef, rib, German <i>reffen</i> to reef	Rifs, zemūdens klints	a ridge of rocks or sand, often of coral debris, at or near the surface of the water
Salina	from Spanish, from Medieval Latin: salt pit, from Late Latin <i>salīnus</i> saline	Sāļezers	a salt marsh, lake, or spring
Sastruga/ Zastruga	from Russian <i>zastruga</i> groove, from <i>za</i> by + <i>struga</i> deep place	Sniegcinīši, atsēre	Usually, sastrugi. ridges of snow formed on a snowfield by the action of the wind

Seiche	from Swiss French, first used to describe the rise and fall of water in Lake Geneva	Seiša/ ūdens līmeņa svārstība	An oscillating wave in an enclosed body of water
Varzea	"flooded forests" in Portuguese	Palieņu mežs (varzea)	low-lying, seasonally inundated region of the central Amazon
Wadi or vadi (oued)	from Arabic wadi "seasonal watercourse"	Izkaltusi upes gultne	the channel of a watercourse that is dry except during periods of rain fall

In case if the phenomenon a particular term represents, is priory known in the TL community, then the culture-specific item can be replaced with its corresponding equivalent. This knowledge can be based on shared historical events, similar geographic position as well as other factors. The following example may be considered: *chernozem – melnzeme*.

Thus, in order to facilitate communication of complicated data and avoid ambiguity in translation of the culture-specific terms, the translator of the scientific and technical texts should have the necessary experience and knowledge of terminology in the particular domain.

3.8. Onomatopoeic terms

The terms belonging to the thematic field “environment and ecology” may be also coined by following the onomatopoeic pattern. Onomatopoeic terms, introduced to a language, undergo the same evolution in sound and, sometimes, even form, as terms coined by using other term-formation patterns.

The etymology of such terms is obvious, as “...*the origin of words that reproduce natural sounds is self-explanatory...*” (Lieberman, 2005; 19). The onomatopoeic terms often denote the source of the sound, as in the case of the names of the birds. These terms are just copies of the real sounds, which have been encoded into the natural language, based on individual perception, and are limited by phonological constraints of the particular language. This fact explains the existence of different names of one and the same concept in different languages. According to

Bakri H.S. Al-Azaam (2008, 122), the recognition of resemblance between a sign and its object is based upon knowledge of certain cultural conventions of interpretation. F. de Saussure (1959) suggests that “...even authentic onomatopoeic words are also chosen arbitrarily, for they in fact only approximate and more or less conventional imitations of certain sounds...”. J. Lyons (1977, 101) supports the Saussurian opinion that connexion between a word and what it stands for is normally arbitrary (i.e. conventional) regardless of the language in which the lexical item is used. These terms have captured in sound the essence of the scientific concept they denote.

The onomatopoeic names of birds are the characteristic cries of the species, which in the particular language are adapted to its specific phonological system. Therefore, it is very difficult for the translators to produce the same onomatopoeic qualities in the target language due to the semantic, phonological and, sometimes, even cultural differences between languages (see Table 17).

Table 17

Onomatopoeic Bird Names

English term	Imitated sound	Latvian equivalent
Crow	Kroh - kroh	Vārna (krauklis – raven)
Cuckoo	Coo-coo-coo-coo	dzeguze
Chickadee	chick-a dee dee dee	Zīlīte (no direct equivalent)
Towhee	Tou – hee	Žubīte
Bobwhite	bob-hwahyt, -wahyt	Paipala
Bobolink	bob-o-Lincol'n	Zvirbulis (no direct equivalent)
Whip-poor-will	Whip-po-wil	Lēlis, vakarlēpis
Chuck-will's-widow	chuhk-wilz-wid-oh	Lēlis, vakarlēpis
Morepork	More"pork`	Vanagpūce
Killdeer	kil-deer'	Tārtniņš
Chiffchaff	chif-chaf, -chahf	Ķauķis

The birds, which were given onomatopoeic names, are best known for the sound they produce, however, they could possess other visible characteristic feature, which could be used to name the same birds in other languages. Reduplicative terms are often onomatopoeic as they denote the ongoing process with the same repetitive sound, for instance, the English term *riprap*, which stands for broken stones that have been thrown together irregularly and are used for foundations (Latvian – *akmeņu uzbērumi*).

3.9. Symbolic Representation

The term as a sign which is used to denote special concepts has a great deal of manifestations: words, collocations, abbreviations, acronyms, symbols, icons, etc. In the process of term formation various symbolic elements are frequently applied to transfer the meaning precisely (cf. Platonova 2009b: 231-239). These elements can be used to coin new terms following the patterns given below:

- combination of elements from various languages, e.g. use of the Greek alphabet letters as parts of contemporary terms (α – particle, β – particle, etc.);
- use of sign nomenclatures from different fields of knowledge (e.g. chemistry: H₂O – water, Cu – copper, Ag – silver, etc.) to represent the same meaning;
- graphical representation of the meaning (e.g., topographic map symbols, professional symbols used in the respective field, etc.)

The use of various symbolic elements in the term-formation process is governed not only by the necessity to compress information, but also by the desire to facilitate the work of experts and simplify the communication process between the representatives of various scientific communities, irrespective of their language competence. There are traditional symbols of the environment-related field used to denote various concepts (Table 18).

Special Symbols Used in Environment-Related Texts

Symbol	Definition	Symbol	Definition
Δ	diagnosis	\pm	indefinable reaction
\diamond	gender unknown	\equiv	identical
+++	powerful reaction	λ	atom energy
E	hurricane	(dull weather
x	Hybridization	*	- Birth - cloudy
+	Positive reaction	++	Significant amount
-	Negative reaction	T	Length of life
V	Systolic pressure	Λ	Diastolic pressure
#	- Amount or mass - Anticyclone	\textcircled{R}	Right
$^{\circ}\text{C}$	Celsius Temperature scale	$^{\circ}\text{F}$	Fahrenheit Temperature scale
K	Kelvin Temperature scale	σ	Unit discharge
ξ	Shezi coefficient	μ	Permeability coefficient
ε	Dielectric constant	α	Alfa particle
β	Beta particle	γ	Gamma particle
P	Partly cloudy	X	- Precipitations - Solar system - Wind power station - Windmill
!	Attention	—	Direction to North
)	Fine weather	D/-	Daily dose divided into equal parts

The analysis of the special symbols in the present thematic field is not the primary aim of this research and deserves a separate investigation.

3.10. Summary

Terminology of the thematic field „environment and ecology” has recently become one of the topical subjects of terminological/linguistic analyses all over the world. The terminological system of the present domain comprises many subfields,

which contribute numerous terms to the thematic field “environment and ecology”. Many modern scientists/linguists/terminologists have investigated lexical items, which denote different phenomena in the particular thematic field.

Environment-related texts contain terminological units (single words or multiword phrases functioning terminologically), which generally possess a very high level of informativity. Texts on environmental and ecological issues are full of terms which are coined using various stylistic devices (analogy, allusion, metaphorical and/or metonymical relations), symbolic elements (different signs, letters from other languages, etc.) and include many culture-specific items which demand a detailed investigation. Therefore, a well-grounded structural-semantic analysis of the terms embedded in the texts on environment-related issues was performed, in order to facilitate the process of terminology research and management, which, consequently, facilitates the process of terminology application (translation).

If we omit formal requirements of text organization and focus mainly on its content, it becomes obvious that the perception of the text depends not only on the knowledge of special meaning representation in the particular language (semantic and semiotic aspects), but it even more strongly on the knowledge about the meaning in use (the pragmatic aspect).

Methods and techniques, which are used to determine the meaning of terms, translate and contrast them have developed to a great extent, however, they are still based on the following main types of analysis: a) the *semantic approach* (meaning formation patterns, semantic fields, thematic fields, a componential analysis); b) the *pragmatic approach* (meaning in the context, discourse, register, genre and style analysis) and the *semiotic approach* (visual representation of meaning, professional symbols, topographical maps, blissymbolic signs for international communication, etc).

When carrying out the analysis of scientific and technical terminology, its development tendencies and harmonization, as well as term application, it is more useful to study it on the contrastive basis. It is significant to take into consideration the fact that the European languages do have much in common, and it allows scientists compare and contrast them at various levels, and, especially, at the textual level.

Taking into consideration the fact that the majority of terms of the thematic field under discussion have been coined in the English language or other foreign languages (but mostly enter Latvian through English), a thorough contrastive analysis is required.

Such factors as a detailed analysis of the contemporary patterns of special meaning formation, the influence of the context on the communicative function the terms perform in the texts and the varieties of symbolic representations of the terms, are very important for the further development of terminology.

Conclusion

The Thesis “Term Formation and Application in the Thematic Field “Environment and Ecology”: Contrastive Analysis” attests to the significance of the analysis of the terminology theory.

Today linguists have recognized that the traditional theory of terminology has a variety of restrictions. The contemporary term application norms are created and recorded based on their practical implementation; therefore, the traditional principles of terminology require reconsideration and should be re-evaluated, as to the process of term formation, its implementation in the text and the communicative settings.

The semantically- and pragmatically-based view of terminology allows us to investigate and analyse terminology not in terms of the structural (morphological term formation patterns) conventions, but rather as a meaning formation practice, which is influenced by numerous complicated semantic relations among terms and is determining the role of the particular term in a given communicative situation.

As the result of the present research *the basic principles of the formation, description and application of modern terms* have been formulated:

- contemporary terms are often created to name an emerging scientific phenomenon, before a well-formulated scientific concept appears – *the semasiological approach to terminology*;
- modern terms are either explained (the semantic aspect) or provided with a context for additional information and better understanding (the pragmatic aspect), or they are accompanied with visual aids (the semiotic aspect) – *representation of special meaning for the needs of communication*;
- terminology is monosemous only in the frame of one scientific field – *adoption of artificial limits for the purpose of terminology unification, harmonization and standardization*;

- terms are studied from the diachronic perspective – *the development of a particular term, the etymological approach as a means for better comprehension of the contemporary meaning.*
- term formation is influenced by the progress in the new technologies – computer linguistics, creation of the artificial intelligence, machine translation, *compiling of terminology data bases and LSP online dictionaries – organization of special knowledge and mechanisms of special meaning extraction (tags and markers, cross-referencing, access to information in the concept system, etc.).*

The basic modern terminology principles stated above are the main theoretical findings of the research. They were formulated as a result of the analysis of the empirical material of the field under discussion. These principles reflect the contemporary tendencies in the terminology development and have a universal character (i.e. to a certain extent suitable for all scientific technical domains).

The organized and scientifically sustained principles of modern terminology creation and use, which govern the terminology research work in any scientific technical field, were formulated to help:

- ***terminologists*** to establish the theoretical background required to study the mechanisms of term formation (morphological, based on semantic shifts, employing stylistic devices) and designation (single unit terms, complex terms, terminological expressions, symbols, etc);
- ***terminographers*** to systematize the empirical results of terminology research work, by compiling a variety of both monolingual and multilingual terminographic resources (thesauri, ontology, data banks, dictionaries, glossaries, etc.) in the printed and electronic form;
- ***linguists*** to investigate various aspects (contrastive analysis, comparative analysis, componential analysis, the theory of semantic and thematic fields, the pragmatic aspect, text analysis, etc.) of terminology application considering a

range of norms (generic conventions, register requirements), rules (grammar) and standards (text organization) in one or many languages;

- ***translators*** to better comprehend the process of meaning transfer and overcome the issues concerning the terminology use in multilingual communicative settings (e.g. lack of the translation equivalent in the TL, nonexistence of the concept in the concept system in the TL, the existence of various translation equivalents for the SL term in the TL);
- ***experts in the particular field of knowledge*** to express information in a precise, clear and an unambiguous way in both monolingual or multilingual communicative settings.

The structural representation of the thematic field “environment and ecology” depends on the organization of the scientific disciplines it includes. The development of terminology of the thematic field “environment and ecology” illustrates the contemporary trends in the process of novel term formation. Due to its interdisciplinary character it reflects other tendencies in the multilingual interaction among various communities.

The terminology under discussion is thematically bound to one particular field of knowledge, and it develops following the rules, which regulate the choice of terms, their obvious applications, as well as their role in the interpretation and understanding of the communicative settings and impact of context on their communicative functions.

Terminology of the thematic field “environment and ecology” is influenced by a large number of the subdisciplines of linguistics (e.g. lexicology, text linguistics, computer linguistics, etc.). The analysis of the text theory gave the author a possibility to study such characteristics of contemporary terms as the precise meaning, correctness of its application and its appropriateness in the text, in order to demonstrate that the use of terms is highly context-bound. Therefore, a thorough

investigation of a textual environment is the starting point for a detailed lexical/terminological analysis and an absolute prerequisite for contrastive studies.

- A great deal of texts on environmental and ecological issues is not homogenous and is structured by adopting the standards and principles of text organization characteristic of each particular type of the text. They also are multidisciplinary in their nature, and combine characteristic features inherited from the major directions in which environment-related texts are produced.
- Texts in the field of ecology and environment protection abound in a great deal of various types of terms with the high degree of substitutability and/or nearly perfect similarity of meanings. These elements (synonyms, variants and doublets) are always applied for particular purposes, but sometimes point to the frames of special knowledge using the sources of general language.
- Environment and ecology related texts contain terms which are coined by using various symbolic elements (different signs, letters from other languages, etc.) or are created by analogy or based on allusion, metaphorical and/or metonymical relations and include very many culture-specific terminological expressions which demand a unified and standardized approach to their application, and, hence, translation.

The investigation of the terminology of the thematic field “environment and ecology” was based on a wide empirical material and the author came to the conclusion that the terms and terminological expressions created following the contemporary patterns are polysemous, context-dependent, based on semantic shifts and/or stylistic devices, however, they are to be considered terms.

Thus, in the course of the conducted theoretical and empirical research the aims of the present study have been achieved and the hypothesis advanced at the beginning of the research has been confirmed.

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Appendix I

Appendix II

Appendix III

