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THE GLOBAL ENVIRONMENTAL THESAURUS PROJECT

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Introduction

1. This paper aims to illustrate the present status of development of the project for the Global Environmental Thesaurus. The history of the project will be summarised, in the framework of an agreement between Consiglio Nazionale delle Ricerche (CNR), the European Environment Agency (EEA), the United Nations Environment Programme (UNEP) and the United States Environmental Protection Agency (US EPA). The role of CNR in the development of the EEA's GEneral Multilingual Environmental Thesaurus (GEMET) and UNEP's ENVOC thesaurus (formerly known as the Infoterra thesaurus) is outlined. The modular components of T-ReKS©, Thesaurus-based Reference Knowledge System© release 2000, developed by CNR and their possible utilization for the UNEP-Infoterra network will be shown. At present, the core thesaurus module is being compiled by CNR with the assistance of UNEP, while UNEP and the other partners of the agreement are expected to identify relevant applications and handle marketing and distribution matters.

The need for a sound environmental vocabulary

2. In this new millennium it is quite evident that, in spite of relevant political and technological changes over the past few decades, no apparent impact has been made to reverse the continuing decay of the global environment. Therefore, the condition of the state of the environment, its problems and the solutions that humankind can implement for sustainable interaction, are important and urgent issues that must be addressed. The impact that correct information to decision-makers, NGOs and general public can have for coping with the environmental problems, is also quite clear.

3. Given its global structure, history and experience, UNEP-Infoterra can play its role as a unique forum for collecting, handling, harmonising and disseminating sound and relevant information of environmental relevance. But what does "sound and relevant information" mean? The technological improvement in the

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collection, management and dissemination of information is leading to 'information overload'. The sound and relevant information required by decision makers, by NGOs and by the general public is difficult to locate and deliver unless suitable means of control of the information are not developed, disseminated and used. Therefore, information control systems based on knowledge organisation and intelligent analysis are of paramount importance.

4. The experience gained by the CNR, from its work on a general multilingual environmental thesaurus and accessory terminologies, has shown that, in order to provide an answer to the need of sound and relevant information, it is necessary to take advantage not only of the terminology and thesaurus disciplines, but also of elements of linguistics, artificial intelligence, knowledge organisation, logics [why not Aristotelian?] and a multitude of scientific disciplines, including information science. In other words, severe problems require the mobilisation of a variety of intellectual resources, a transversal, trans-disciplinary approach, and the implementation of open, intelligent strategies.

The History of the project

5. During the last year, CNR, EEA, UNEP and US EPA have been engaged in a dialogue to establish a project to develop a global environmental thesaurus. UNEP's ENVOC thesaurus had broad multilingual coverage but narrow content coverage. EEA's GEMET thesaurus had broad content coverage but narrow multilingual coverage (European languages only). The idea of a comprehensive global thesaurus was proposed by US EPA who foresaw the possibility and opportunity to translate an improved thesaurus based on the multilingual thesaurus GEMET of the EEA, that CNR had in the meantime proposed to US EPA, into languages of the APEC area. From the outset, CNR, owing to the past collaboration with UNEP-Infoterra on the EnVoc thesaurus, as well as with US EPA and EEA, favoured this idea of a new global thesaurus. The four lead organisations met in Santa Fe, New Mexico in January 2000 and through a quadrilateral agreement, called the *Santa Fe Agreement* [1] decided to pool experience and expertise and mobilise external partners to develop a multi-thematic, multilingual vocabulary of the environment.

6. The development of the project on the global thesaurus is expected to be influenced by at least four factors:

- A global vision to break down linguistic boundaries to access to sound and relevant information on environmental matters;
- The availability of qualified and motivated personnel;
- The availability of suitable financial resources, which in turn depends on the interplay between demand and offer of a quality product; and, last but not least,
- The commitment of environmental agencies and ministries of the environment to provide national-level input to support the global initiative.

7. At present, CNR is devoting the full time effort of five staff members bringing more than ten years experience in the construction of multilingual thesauri for the environment. The first meeting of the four lead agencies is planned for October 2000 to design the project.

8. It is interesting to recapitulate the history of the concept of a reference thesaurus for the environment. All of us have been taught that the correct approach to a scientific enterprise requires a preliminary, exhaustive bibliographic search on the available knowledge and resources in a particular sector. This is not only for scientific and intellectual honesty, but also to save time, energy and financial resources. In the late 1980s CNR had the idea of a reference language for the environment - a language that could be shared at least at the European level. The terminological resources available at that time, included the *Multilingual Descriptor System* (MDS) of the European Commission comprised of 1,400 terms in six European languages, edited in 1983 [2], and a short Infoterra list of less than 200 terms, edited in 1984 [3].

9. In 1990, the monumental contribution by Paenson appeared - *Environment in Key Words: A Multilingual Handbook of the Environment*, composed of 4,100 terms in four languages [4] and the first Infoterra thesaurus with 1,200 descriptors in five of the languages of the UN systems [5]. It is interesting and regretful that both MDS and in particular Paenson's work -fruit of 18 years of dedicated effort- were not widely marketed or disseminated among the user community and therefore received little acknowledgement. Only the MDS was further developed by CNR in 1989 in a Bilingual Descriptor System [6], by merging the English and Italian terms of MDS with 144 terms of the Infoterra thesaurus 1984 [3] and with 500 CNR terms. The Bilingual Descriptor System, like MDS, had no thesaurus structure but its added value was an improved, sophisticated thematic and sub-thematic classification scheme.

10. In the early 1990s, while monolingual environmental thesauri were being developed in Germany, the Netherlands, Spain and France, the only reference multilingual thesaurus was the Infoterra thesaurus. Since 1989, CNR had started work on the development of a parallel environmental thesaurus, based on the Dutch Milieu-thesaurus [7]. This thesaurus was chosen since its structure and size (2,369 terms) were deemed satisfactory. The 2,369 terms were very well structured in a thesaurus system made up of a core thesaurus and a series of thesaurus-structured lists of national interest. The Milieu-thesaurus was translated into English, Italian and German and published as CD-ROM by CNR in 1993 [8].

11. In 1994, in the context of collaboration with UNEP-Infoterra, CNR translated into Italian the Infoterra thesaurus [9] and disentangled its structure as a preparatory step for the participation of CNR in the compilation of the UNEP-Infoterra EnVoc, edited in 1997 [10]. In 1995, in collaboration with the Dutch institution responsible for the Milieu-thesaurus, CNR produced on behalf of the Task Force of the European Environment Agency (Brussels), the MET, Multilingual Environmental Thesaurus [11] and a Classification Scheme for the same thesaurus [12]. The MET contained the 2300 terms of the Milieu-thesaurus translated into eight languages.

12. In 1996, CNR and other thesaurus custodians convinced the EEA, which in the meantime was moved from Brussels to Copenhagen and did not intend to adopt (even temporarily) the MET, to launch a new, broader initiative for the development of a multilingual thesaurus. This thesaurus had to include 2,000 terms selected from the Umwelt Thesaurus [13], 2300 terms of the Italian CNR Thesaurus [8], 2,000 terms of the MET Classification Scheme [12], the whole MET [11], the UNEP-Infoterra EnVoc [10], as well as selected portions of the Spanish Thesaurus de Medio Ambiente [14] and the French Lexique Environnement Planète [15].

13. The idea was accepted to merge in a unique thesaurus the best terminologies of the six existing multilingual thesauri, in order to propose a reference thesaurus to the different (European) organizations and to provide an agreed common language basis for the exchange of environmental information. The task of compiling the thesaurus was delegated to CNR, Rome and UBA, Berlin. In order to ease the translation burden and to obtain an exact correspondence between the concepts expressed in different languages and the English representation of the terms, it was decided to complement almost all the terms of the thesaurus with a definition in English, obtained by an authoritative source

14. By this means, the thesaurus was prepared to satisfy the three functions:

- system of controlled terms
- multilingual dictionary
- glossary.

In 1998, a preliminary version of the thesaurus was tested and interactively applied in a successful way to an Italian environmental information system of national extension [16]. In 1998, the whole terminology was made available in British English, American English, Italian and German and translation to the other European languages was performed by the EEA and by the EEA's Topic Centre for the Catalogue of Data Sources ETC/CDS, [which was coordinating the application of the thesaurus].

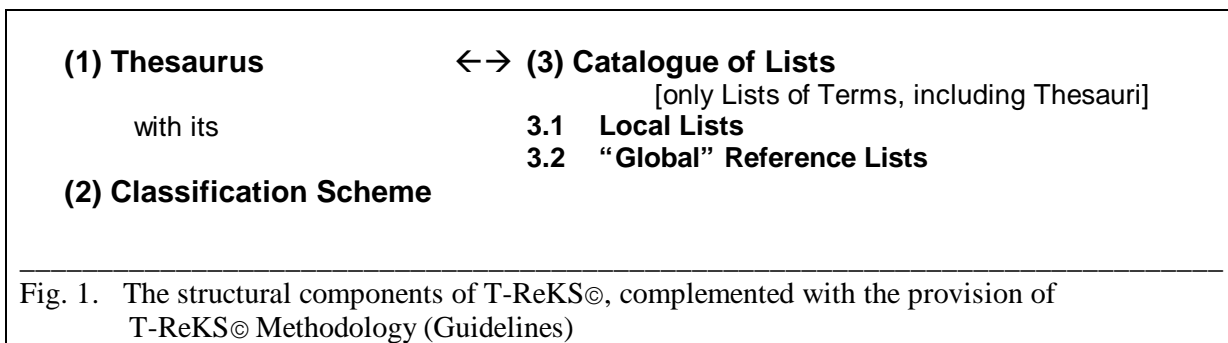
15. In 1999 the final version of GEMET was published [17] as a tool of the EEA’s CDS: a thesaurus of 5,300 preferred terms in twelve languages and 1,200 synonyms in English. At present, GEMET is applied to the Catalogue of Data Sources of the EEA’s ETC/CDS and as a multilingual dictionary and it is used in the search engine of the EEA website.

The T-ReKS 2000[®], Thesaurus-based Reference Knowledge System[®]

16. The expertise and research experience gained by CNR during 12 years of work on environmental knowledge, terminology and thesauri of variable origin, language, nature and quality, motivated CNR to design and implement a system for the extraction, handling and application of controlled environmental terminology, named T-ReKS[®], release 2000.

17. T-ReKS 2000[®] is a conceptual and informatic system based on thesaurus, structured in modular way, based on a complex methodology and comprised (Fig. 1) of:

1. Conceptual and informatic activities and tools for text analysis and term extraction;
2. Conceptual and informatic tools for the organization and control of reference terminology for the management of data and metadata:
 - **The Classification Scheme of the Thesaurus**
 - **The Thesaurus, with its Glossary and Multilingual Dictionary functions**
3. A tool for the access to- and control of the non-thesaurus terminology, used in all the applications:
 - **The Catalogue of Lists and Thesauri** (might be abbreviated as CLiT or CLaT)
4. Guidelines, instructions and educational activities for the application of these instruments to different information and documentation systems and for the correct use of the T-ReKS[®]: relations between the core thesaurus, the thematic graphs, the data dictionaries, the free terms, the proposed terms, etc.



The classification scheme

18. The thesaurus hierarchy represents the traditional instrument for the semantic control, but it represents also a way to address the indexing activities, easing the identification of the most appropriate term through the visualisation of its semantic context. Having identified a term (even if using the alphabetical list), the user is informed of the existence of more general and specific terms and placed in a mode to refine its work on indexing and/or searching.

19. The Classification Scheme is the internal means of control of the thesaurus terms. In the global thesaurus this control mechanism will be different from that used in GEMET. Of the various approaches for mastering and handling a global reference environmental terminology, an approach enhancing the interaction between environmental problems and solutions will be adopted. Thus, the classification scheme will enhance the thematic interplay between problems, decisions, and solutions, like in the Bilingual Descriptor System of CNR [6] (Fig. 2).

Problem	Approach / Measures	Solution
• Risk	“Prevention”/Preventive Measures	Avoidance of Damage, Protection, Conservation
• Damage	“Therapy”/Coping Measures	Restoration

Fig. 2. The Rationale of the Global Thesaurus Themes for the Classification Scheme

20. On the other side, its categorical structure will be readjusted, to make it more readily adaptable for interaction with the environmental ontologies that are being developed in the meantime [19]. Work in this direction is in progress, along the lines of knowledge organisation in thesaurus design and construction, recently highlighted [Schmitz-Esser, 20]. The classification scheme of the thesaurus cannot be exported as such to other applications, e.g. to Data Organisation Graphs.

The thesaurus

21. The thesaurus plays an important role as a tool for the conceptual and formal control of the information flow concerning the environment. It will also be useful as the link element between different environmental information systems and the catalogues of similar national structures. From the thesaurus it will be possible to access the databases of any institution responsible of data that has adopted the thesaurus for the management of its environmental information system. The thesaurus could also be a useful instrument for the compilation of the reports on the state of the environment and for the organization of libraries and documentation centres.

22. In general, it can be assumed that this new product will be a reference tool for librarians, documentalists, database developers, thesaurus developers, terminologists, geographic information system (GIS) specialists, translators, interpreters and the broad spectrum of environmental information users.

22. As a whole or in part, it can be employed as a checklist for several different applications: e.g. the conceptual coverage of a particular issue in the course of an environmental assessment. The construction of GEMET had shown that different users are interested to different presentations and expressions of the thesaurus, so that it is difficult to design a product that can satisfy very different requirements. The structure of this core thesaurus will be flexible enough to accommodate regional and national extensions; it will contain terms representing general concepts, suitable for describing data, metadata and classification systems.

23. The thesaurus core will be linked to complementary extensions containing terms that are peculiar to a country or region – mainly organizational attributes (ASEAN, SADC, OAS, GCC, etc.) and geographic attributes (Zambezi basin, Amazon Delta, Great Barrier Reef, etc) but also some environmental terms (Highveld ecosystems, Sorghum, Customary Law, etc) and terminologies needed by the environmental impact statements (EISs): standard lists of international usage; standard lists of national or local use; specific international, national, local terminologies; and so on.

24. The recommended size of the global thesaurus can encompass a number of preferred terms between 8,000 and 10,000 and a number of non preferred terms variable in different languages, but estimated in several thousands for each language. The work of compilation of this thesaurus is at present under way at CNR in Rome. The first step of integration with significant terms of the original thesauri has been concluded and the preferred terms have increased from the 5,300 of GEMET to 8,500. A certain number of these terms will be excluded from the thesaurus in the second step of the work, while in the third step the new terms coming from international agreements and conventions on the environment will be added. The implementation of this last step has already started in the context of an interaction with UNEP. The first release of the global thesaurus is expected by the end of 2001.

24. It is obvious that the dimension of the global thesaurus can be limited only by three criteria and operations:

- (1) the exclusion of terms not pertinent because too general;
- (2) the scattering in accessory lists of terms not pertinent because too specific or of too local interest;
- (3) the linking of these specific lists/extensions to already existing, if and where existing, authoritative lists.

The thesaurus core is linked to the Catalogue of Lists and Thesauri.

The Catalogue of Lists and Thesauri (CLiT/CLaT)

25. T-ReKS© assumes that each information system that uses the thesaurus may need, for indexing and retrieval, a variety of complementary terminologies in the form of lists or thesauri, that can be listed as:

- Standard reference lists, ISO, UN, etc.
- Terminologies of thematic graphs that controls databases;
- Terminologies of databases not controlled by thematic graphs,
- Thesauri, e.g. Agrovoc [21], INIS thesaurus [22], etc.;
- Specific local lists, e.g. the red lists of a particular country or geographical region;
- Specific glossaries containing terminology of relevant interest for the environment;
- Authority lists used in libraries or boards or departments of specific environmental institutions;
- Terminologies of the environmental ontologies;
- Specific coding systems ;
- Classification systems, and so on.

26. These complementary terminologies [“extensions”, “blades”] are not themselves part of the T-ReKS© system: they are usually compiled and managed by their compilers and/or editors. Not only, but these accessory elements can be available in a variety of languages of origin. As regards the source language, i.e. the language of compilation of the global thesaurus, it must be mentioned that the thesaurus is compiled in British English and in parallel matched with the “International English” that is close to the North American English. Also the definition of terms are provided in English. It is only after the conclusion of the compilation task that the translation of the thesaurus in non English languages is foreseen, with the preference for the official languages of the UN: Arabic, Chinese, English, French, Russian and Spanish. As a consequence, the terminology in English of the thesaurus, including the definitions of the terms, will represent the “global reference language”.

26. The CLiT/CLaT contains a limited but exhaustive number of data, sufficient and necessary for the identification of a complementary list or thesaurus: among them, the title of the list/thesaurus in the original language, a limited number of keywords in English that exhaustively represent the conceptual content of the list/thesaurus, and the quotation of the source, including the URL. The link of these keywords to the terms of the global thesaurus allows the interested users to access the (set of) selected list(s)/thesaurus(i) from the thesaurus or vice versa. Keywords not pertinent to the global thesaurus, e.g. names of working languages, names of countries, historical series of dates, will be stored in the T-ReKS© and suitably displayed to the user. Also the terms candidate to the thesaurus between two releases of the latter, will be stored in the system.

27. It is evident that the central thesaurus module of T-ReKS© aims to represent an essential common reference language for the environment at a global level. The Catalogue of Lists/Thesauri on the other hand, allows the different users of the T-ReKS© system to be informed on the existing lists and on the whole set of national and regional extensions used in local information systems.

Brand name

28. Irrespective of what brand name is chosen for the global thesaurus, it should be:

- Universally acceptable to stakeholders;
- Independent of regional or national influences;
- Instantly recognizable to potential users
- Portable across language barriers
- Accompanied by a highly visible logo
- Promoted extensively
- Copyrighted by the partner of the consortium responsible for its development

Conclusion

29. The four lead agencies invite interested national or regional organisations to participate in the global thesaurus project so that terminologies that are specific to local environmental conditions and local languages are included in the overall global vocabulary.

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Annex 1. Global Thesaurus – Tentative List of Product Definitions

International (UN) Products

- PRODUCT 1 – Core Thesaurus - English
- PRODUCT 2 – Core Thesaurus – UN package 1 (E, F, S)
- PRODUCT 3 – Core Thesaurus – UN package 2 (A, C, R)

Europe (UN/EU) Products

- PRODUCT 4 – Core Thesaurus – UN/EU package
- PRODUCT 5 – EEA package (European adaptation of Product 4)
- PRODUCT 6 – EEA/CEEC package (CEEC extension of Product 5)

Europe/CIS products

- PRODUCT 7 – EEA/Baltic package (UN package E , R, + Latvian, Lithuanian, Estonian)
- PRODUCT 8 – CIS package (UN package E, R + Ukrainian, Belorussian, etc)

North America products

- PRODUCT 9 – North America package

Asia & Pacific products

- PRODUCT 10 – N-E Asia package
- PRODUCT 11 – S-E Asia package
- PRODUCT 12 – South Asia package
- PRODUCT 13 – West Asia package

Africa products

- PRODUCT 14 – North Africa package
- PRODUCT 15 – East/Central Africa package
- PRODUCT 16 – West/Central Africa package
- PRODUCT 17 – Southern Africa package

Latin America and Caribbean products

- PRODUCT 18 – South America package
- PRODUCT 19 – Central America package
- PRODUCT 20 – Caribbean package

Other miscellaneous products

- PRODUCT 21 – JACUSNZ package
- PRODUCT 22 – Mediterranean package
- PRODUCT 23 – Caspian Sea package

Annex 2. The Santa Fe Agreement

Meeting in Santa Fe, New Mexico, the Consiglio Nazionale delle Ricerche (CNR) of Italy, the European Environment Agency (EEA), the US Environmental Protection Agency (US EPA) and the United Nations Environment Programme (UNEP),

Have agreed to collaborate on the development of a global multilingual environmental thesaurus and within this collaborative framework, the partners

have further agreed that:

- 1. A global thesaurus steering committee comprised of one representative and alternate from each agency will be established. The steering committee will be supported by ad hoc working groups, to be established as and when needed.*
- 2. The master file of GEMET 2.0 is the master file held by the European Topic Centre for the Catalogue of Data Sources (ETC/CDS) in Hannover. The working file is maintained by CNR in Rome.*
- 3. GEMET 2.0 will be stabilised for the year 2000.*
- 4. In parallel with the stabilization of GEMET 2.0, CNR will revise the thesaurus working file in order to develop version 2001 of the global multilingual environmental thesaurus. It is anticipated that this revision will reflect all the necessary amendments and will be completed in the year 2000. The other partners will assist with this exercise through an expert group process. GEMET 2.0 and its alphabetical annex, with appropriate revisions and addition of terms pertaining to international environmental treaties, the Global Environment Facility (GEF), and other sources of environmental terminology, will contribute to the global environmental thesaurus.*
- 5. The 2001 version in English will be the core of the global thesaurus.*
- 6. The core thesaurus will be globalised through the addition of regional and national extensions which will include additional terms and additional languages. It is anticipated that this work will be carried out in cooperation with associate partners, to be identified at the regional and national level.*
- 7. CNR will provide a set of guidelines on regional and national extensions to the thesaurus. After approval by the steering committee, these guidelines will be distributed to the regional and national associate partners.*
- 8. The steering committee will address pending issues including the brand name, intellectual property rights, copyright, future collaboration and marketing issues. Consultations will be held through electronic conferences as and when appropriate.*
- 9. A project proposal and budgeted work programme will be developed, discussed and agreed upon, outlining the vision, goals, products, quality assurance measures, applications opportunities, marketing arrangements and responsibilities of each partner. External funding sources will be sought as appropriate.*

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Acronyms

Acronym	Expanded
APEC	Asia Pacific Economic Cooperation
ASEAN	Association of South East Asian Nations
CDS	Catalogue of Data Sources
CD-ROM	Compact Disc Read Only Memory
CEEC	Central and Eastern European Counties
CIS	Commonwealth of Independent States
CLiT/CLaT	Catalogue of List and Thesauri
CNR	Consiglio Nazionale delle Ricerche
EEA	European Environment Agency
EIS	Environmental Information System
EPA	Environmental Protection Agency
ETC/CDS	European Topic Centre for the Catalogue of Data Sources
EnVoc	Environmental Vocabulary
GCC	Gulf Cooperation Council
GEF	Global Environmental Facility
GEMET	GEneral Multilingual Environmental Thesaurus
GIS	Geographic Information System
INIS	International Nuclear Information System
ISO	International Standard Organisation
ITBM	Istituto Tecnologie Biomediche
JACUSNZ	Japan,U.S., Canada, Australia, New Zealand
MDS	Multilingual Descriptor System
MET	Multilingual Environment Thesaurus
NGOs	Non Governmental Organisations
NM	New Mexico
OAS	Organisation of American States
RRDA	Reparto Ricerca e Documentazione Ambientale
SADC	Southern African Development Community
T-ReKS©	Thesaurus-based Reference Knowledge System
UBA	Umweltbundesamt
UN	United Nations
UNEP	United Nations Environment Programme
EU	European Union
URL	Universal Resource Locator
US	United States
US EPA	United States Environmental Protection Agency