

40 Shades of Technology Transfer

- a compilation of concepts -



Technology Transfer through the
Clearing-House Mechanism
An excerpt of a
- Study from Germany -

Study funded by the
German Federal Agency for Nature Conservation (BfN)
on behalf of the
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'Technology Transfer' is a term that evokes different meanings for different people. Technology Transfer can be interpreted broadly or narrowly; it can imply transfer of technology in one direction or be multidirectional. Technology transfer may be seen as flow of knowledge by moving ideas from invention to new products, processes and services in practical use. Technology Transfer may also be described as a complex and often costly process of learning from others, where the objective of the transfer is not achieved until the transferee understands and can lastingly utilise and finance the technology.

The meaning of technology transfer even becomes more difficult to clearly identify if applied to the wide spectrum of biodiversity. Biodiversity spans manifold integration levels from the single molecule to the biosphere and is mirrored on diverse levels by biodiversity technologies as :

- biotechnologies (molecular and cellular uses of biological systems)
- bio-resource technologies (uses of genetic resources, organisms or parts thereof)
- bionics (derived engineering principles from natural systems) or
- ecosystem-technologies (ecologically-derived practices for managing ecosystems) and
- Biodiversity-sound technologies (adaptive technologies that do not severely impact biodiversity).

Also the programme of work of the Convention on Biological Diversity presents specific requirements on TT:

- thematic work programmes
- cross-cutting issues and
- the ecosystem approach adds further facets of biodiversity technologies needed.

With '**The 40 Shades of Biodiversity Technology Transfer**' we exemplarily glance at the diverse 'soft' and 'hard' technologies grouped in eight main clusters being identified during the study as possible TT areas. These 8 clusters are visualized on the Poster 'The 40 Shades of Biodiversity Technology Transfer' in the center of this paper. To each of the eight clusters a selected list of project numbers is attached. They represent only a 'Shade' on the variety and diversity of technologies potentially being transferred or which could be points of technology cooperations.

This brochure also shows that the transfer concepts and strategies as well the varieties of needs-assessments and forms of interaction between technology-providers and technology-recipients are manifold and by far not linear. It also indicates that any technology transfer activity is bound to direct contacts between the future partners. It needs contacts, assistance and monitoring from the early beginning of identifying needs until the far end of being implemented.

The diversity of technologies, transfer concepts and interactions are highlighted by using the '40 Shades' term. There are many, many more 'shadows' than the 40 we present, but they provide examples for this diversity. It can also be stated from our national experiences, that there is a need of a practical beginning of technology transfer under the CBD via its Clearing-House Mechanism (CHM).

R & D Project 'Technology Transfer via the Clearing-House Mechanism'

Technology transfer (TT) is a topic of fundamental importance for the implementation of the Convention on Biological Diversity (CBD). The CBD closely interlinks provisions on TT in Articles 16 (Access to and Transfer of Technology) and 19 (Handling of Biotechnology and Distribution of its Benefits) along with Articles 12 (Research and Training), 17 (Exchange of Information), and 18 (Technical and Scientific Cooperation). On item IX/4.2. 'Technology transfer and Cooperation' SBSTTA IX has proposed that the clearing-house mechanism (CHM) should be a central mechanism for exchange of information on technologies, for facilitating TT and cooperation and to promote and facilitate technical and scientific cooperation relevant for the conservation and sustainable use of biodiversity, and for technologies that make use of genetic resources.

To contribute to these discussions on the future role of the CHM in TT in general and the role of the CHM on national level in Germany, the German Federal Agency for Nature Conservation (BfN, www.bfn.de) on behalf of the German Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU, www.bmu.de) commissioned a study on 'Technology Transfer via the Clearing-House Mechanism'. The study analysed in broad terms the existing mechanisms and experiences of technology transfer in Germany. Through this activity it was expected to prepare the ground for the creation of awareness on national level on the existence of the CBD and the requirements to develop and facilitate TT within the needs of the CBD and the role the national CHM could play in this national network of interested TT institutions and / or mechanisms. It is not intended to build new TT structures / mechanisms but to build on the existing national TT mechanisms and also to introduce the relevance of biodiversity to their work.

This brochure 'The 40 Shades of Technology Transfer' presents some relevant findings of this study.

In the center of this brochure the Poster on 'The 40 Shades of Technology Transfer is presented'. It presents a very first approach to the huge diversity of technologies relevant to the CBD and the also huge variety of TT mechanisms and systems. This brochure does by no means cover the full range of questions related to TT. But it provides some ideas and intends to provide some feelings 'the smell' on what we talk, when we talk on biodiversity-relevant TT and what implications could this mean for our work and the role of the CHM. **The Poster 'The 40 Shades'** also provides 8 main clusters of technologies which were identified as potentially relevant for the CBD. For each of the main 8 groups the brochure provides a handful of concrete project examples with internet addresses. This is intended to **also inspire reflections** on the potentially existing technologies needed and/or to inspire observations in the own area of work on what could be explored for future 'technologies' e.g. bionics.

Definitions of TT

Def. 1) The Convention on Biological Diversity (CBD) does not have an own definition of technology transfer. In Art. 2 'Use of Terms' it only states that 'technology includes biotechnology'. Article 16 on 'Access to and Transfer of Technology' substantiates in para 1 that '*both access to and transfer of technology among Contracting Parties are essential elements for the attainment of the objectives of this Convention*', and clarifies that technologies '*are relevant to the conservation and sustainable use of biological diversity or make use of genetic resources and do not cause significant damage to the environment*'.

Def. 2) The IPCC Technology report on 'Methodological and Technological issues in Technology Transfer' trying to define TT in the context of global change defines 'technology' as '*a piece of equipment, technique, practical knowledge or skills for performing a particular activity*', and 'technology

transfer' as *'the broad set of processes covering the exchange of knowledge, money and goods amongst different stakeholders that lead to the spreading of technology for adapting to or mitigating climate change'*.

Def. 3) Technology transfer, as defined by the **United Nations Conference on Trade and Development (UNCTAD)**, is the *'transfer of systematic knowledge for the manufacture of a product, for the application of a process, or for the rendering of a service'*. Quite similar the European Environmental Agency puts it as *'the transfer of knowledge or equipment to enable the manufacture of a product, the application of a process, or the rendering of a service'*.

Def. 4) The **African Centre for Technology Studies (ACTS)** together with the **World Resources Institute (WRI)** define technology transfer as a *'non-linear flow, from one production locus to another, of systematic knowledge, skills and equipment for the manufacture of a product and / or the application of a process to generate a product or service'*.

Def. 5) As first parliament of the world the **'Deutsche Bundestag'** has installed a so-called **Enquete-Commission 'Globalisation of the World Economy – Challenges and Answers'** that systematically deals with the globalisation process. In it's final report it highlights the importance of TT for a sustainable development and defines TT as the systematic export of technologies from one country to another, organized under aspects of economy and environmental and development policy. This transfer mostly takes place from highly industrialized countries to developing countries or countries with economies in transition. Technology transfer has to be differentiated with respect to hardware (technical equipment) and software (creating institutional and organizational preconditions for implementing the technologies – capacity building) including qualifications.

TT in German Practice

In Germany several hundred institutions are actively dealing with aspects of biodiversity Technology Transfer.

Government-based international cooperation sector: The main cooperation unit is the government-owned **Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ, www.gtz.de, German Society for Technical Cooperation)**. Its goal is to enhance the capabilities of people, organisations and institutional structures in the partner countries. Technical Cooperation means transferring knowledge and skills and mobilising and improving the conditions for their use. Technical Cooperation strengthens the individual initiative of the people so that they can improve their living conditions through their own efforts. The **GATE-Initiative (German Appropriate Technology and Ecoefficiency Programme)** as part of the **GTZ (www.gtz.de/gate)** provides an information service on the adaptation and dissemination of technologies, regional NGO cooperation, small scale project fund and coordination service for appropriate building technologies. With some countries (e.g. Argentina, Brazil, China, Indonesia) the German Government has established Scientific-Technical Cooperation contracts with many technological joint projects also in the biodiversity realm.

Science sector: In the public sector more than 40 universities installed contact offices for TT. The **Helmholtz Community (HGF, www.helmholtz.de)** joins 16 big research institutions, the **Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz (WGL, www.wgl.de)** 80 research institutes, each of them having a TT department. The leading organization for institutes of applied research is the **Fraunhofer Community (FHG, www.fraunhofer.de)**; many of the more than 50 member institutes run branch offices abroad in Europe, the USA and Asia. The **Max-Planck Community (MPG, www.mpg.de)** is Germanys largest private organisation for fundamental research, joining more than 80 research institutions, running the **Garching-Innovation Cooperative (www.garching-innovation.de)**. More than 500 transfer institutions are joined in the **Steinbeis Foundation (www.steinbeis.de)**, interlinking partners in more than 40 countries worldwide.) To promote the trans-

fer of research ideas into products and services, Germany's research umbrella organisation, the **Deutsche Forschungsgemeinschaft (DFG, www.dfg.de)** has established an 'Ideenwerkstatt'.

Governmental sector: The German Ministries and their agencies run several TT projects. For instance the **Federal Ministry for Science, Technology and Education (BMBF, www.bmbf.de)** participates in a so-called 'Innovation Market' (www.venture-management-services.de/innovation). That is an innovation marketplace operated on the Internet by the **Deutsche Börse AG** (German Stock Exchange) and the **Kreditanstalt für Wiederaufbau (KfW, www.kfw.de)**, Reconstruction Loan Corporation). The Innovation Market has been set up in order to systematically bring together highly promising ideas, capital and companies. Special quality standards are used to assure the quality of the offers available on the Innovation Market and their demand-based processing. To stimulate innovations and the creation of patents the BMBF has initiated **INSTI (www.insti.de)** - innovation stimulation. The **Federal Agency for the Environment (UBA, www.uba.de)** has launched internet TT portals, e.g. 'Cleaner Production Germany' (CPG, www.cleaner-production.de) which provides in-depth and comprehensive information about the performance of German environmental technologies and environmental services.

Being a federal state all of the 16 German 'Länder' have TT institutions, e.g. Bavaria the **Technology-Net-Bavaria (www.ti-netz-bayern.de)** that provides a data basis of more than 100 institutions enabling know-how-transfer between researchers and industry.

Private sector: 82 Chamber of Commerce and Industry run a technology market (www.technologieboerse.de) to enable contact between providers and users of technology. The central interest of the **German Federation of Industrial Cooperative Research Associations (www.aif.de)** is to facilitate research interlinked to SME (small and medium-sized enterprises). A lot of enterprises offer their services as technology brokers. More than 200 **technology and founder centres** provide a cost-efficient environment for technological start-up companies and organise the TT to research organisations and other companies.

The **German Information Secretariat of Biotechnology (www.i-s-b.org)** is one example for a technology platform especially related to biotechnological issues. On an European level this service is provided by the **EFB European Federation of Biotechnology (www.efbweb.org)**. In contrast, the majority of technology transfer institutions is dealing with technology in the broadest sense. Future initiatives within the technology transfer institutions should develop mechanisms to compile biodiversity related informations specifically.

Non governmental sector: Many foundations are dealing with technology projects and transfer of know-how, inter alia the **Alexander von Humboldt-Stiftung (AvH, www.avh.de)**, the **Deutsche Bundesstiftung Umwelt, (DBU, www.dbu.de)**, the **Volkswagenstiftung (www.volkswagenstiftung.de)** or the **Daimler-Benz-Stiftung (www.daimler-benz-stiftung.de)**.

Several non-stately development aid organisations as 'Misereor' or 'Brot für die Welt' support sustainable and biodiversity-friendly technologies in partner countries of the South.

Members of the **AT-Verband - Association for the Promotion of Socially and Environmentally Appropriate Technologies** - a federation of about 90 independent consultants, researchers, trainers, institutes and consultancy companies - work in the North, East and in the South; their main subjects and experiences include agriculture, forestry, natural resources, renewable energy systems, social and cultural development.

Technology transfer in Germany is either demand-driven or – overwhelmingly - offer-driven.

Examples of demand driven ./ need assessment based TT in Germany

These approaches try to assess the needs of customer groups by different means. These means can include **question-answer-services (www.gtz.de/gate)**, where the customer initiates the

knowledge transfer through his questions, or the customer can be enabled to formulate questions by a **voucher system (Rural Universe Network, www.runetwork.de)**. Such transfer can lead to the establishment of Rural Information Centres that are operated by fully self-sustained Rural Information Brokers (RIBs); (they act as interface between the local and the global information society. RIBs assist the rural population to use the Internet; as correspondents they participate in project monitoring, collection of data and information and in public campaign).

Professional need assessment can include **active customer-to-provider brokerage (www.wissrech.de)** where an agent (mostly paid by the customer) actively tries to find the holder of a technique that meets the customers demand or even tries to initiate the development of a technical solution. Demands for TT can also be formulated in a **national strategic plan** (e.g. **Republic of Chile, www.conicyt.cl**) that list fields of interest or technology that will be given priority in the development of a country or are needed to solve a defined problem.

Examples of offer driven TT in Germany

These approaches try to initiate TT by advertising and promoting existing technology through different means. These means can include the establishment of **customer-orientated information platforms (www.fraunhofer.de)** or **thematic information platforms** (product oriented) (www.dihk.de, www.cleaner-production.de, www.ituf-ev.de). The development of such platforms follows road maps of interdisciplinary teams who integrate the feedback of external experts. The TT platforms span from individual projects with 3-5 participants to exhibitions with hundreds of visitors. One successful concept in Germany is the 'One-To-One' platform (www.bayern-innovative.de), where an internet-based catalogue presents the compilation of the competence of TT-providers. Possible customers can visit this platform to consult the catalogue and then can arrange short dialogues with selected partners.

A more **active provider-to-customer brokerage (www.garching-innovation.de)** is represented by TT-brokers who directly contact research institutes and compile their inventions, new products and know-how. The brokers then try to bring these technologies to the market. This brokerage operates commercially in most cases.

TT and the German CHM

The CHM as the central means 'to promote and facilitate technical and scientific cooperation' is expected to play a crucial role in facilitating both the access to – both hard and soft - technologies and the transfer process.

Many existing TT institutions already partly cover ways, means and technology contents the CBD TT process deals with. But none of them covers more than aspects of the wide field of biodiversity technologies and biodiversity sound technologies. Having identified the biodiversity-related aspects of these TT systems (and also the gaps they leave) it was a clear conclusion that the CHM should build upon these existing national initiatives and find ways and means to facilitate the building of a national network of partners interested in TT relevant to the CBD. The clearing-house mechanism as a central mechanism for exchange of information on technologies, for facilitating technology transfer and cooperation and to promote and facilitate technical and scientific cooperation relevant for the conservation and sustainable use of biodiversity, and for technologies that make use of genetic resources. How this network will work and function this will be explored in the next months. As a first start, those institutions interested in this national cooperation are listed as contact partners on the TT website of the German CHM.

Some Points for Consideration

- The clearing-house mechanism should be developed as the key facilitating mechanism for technology transfer, technology cooperation and the exchange of technology information under the CBD.
- The CHM should start now in a pragmatic and practical way to establish, in a first step, a TT information platform to facilitate the dissemination of information on technologies, projects and on case studies, which should facilitate also the building of first contacts among TT users.
- The TT process should take into account the five 'stages' proposed by IPCC
 1. assessment (including identification of needs),
 2. agreement,
 3. implementation,
 4. evaluation and adjustment, and
 5. replication.
- The CHM should work in a 'maieutic' (= Socratic / midwifery) fashion, i.e.
 - to facilitate partners to identify their real needs
 - to enable them to choose the 'right' technologies
 - to facilitate the matchmaking with key offers
- Any TT activity within the CHM should build upon existing biodiversity-related TT systems and contents. This should facilitate the development of a biodiversity-related TT network and should catalyze and channel the broad spectrum of identified biodiversity technologies and know-how.
- Besides the technical part of TT, personal contacts are decisive for a successful TT.
- The CHM should also provide information about best practices of capacity building including e-Learning concepts i.e. blended learning.
- Through the CHM information should be provided about institutions that provide assistance in a cost saving access to technologies that are protected by IPRs by, inter alia, coordinating technology holders and demanders.
- The CHM should facilitate access to information on the assessment and certification of technologies, inter alia by providing a data source.



Biotechnologies

Biotechnologies are technologies that capitalize on the attributes of cells, such as their manufacturing capabilities, and put biological molecules, such as DNA and proteins, to work for us. They comprise any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify.

1

Green Biotechnology: for food and agriculture

Combatting viruses, protecting plants: Producing plants that are resistant against many plant viruses and drastically reduce crop losses. Small molecules hinder the viruses from replicating and thus from becoming crop pests. Plants have not to be treated curatively.

http://www.img-rlp.de/primaermenue/informationen/technologie_angebote/biologie_medizin_lifescience/bekaempfung_viraler_pflanzenerkrankungen

2

Grey Biotechnology: sound environment sounds biotech

Value products from the waste: Whey, especially acid whey, is seen as a waste product in milk processing. The world production amounts to about 82 million metric tons. But an environmentally sound process has been developed for the manufacturing of lactic acid from acid whey. Thereby waste treatment has been combined with the production of valuable materials.

http://www.igb.fhg.de/WWW/GF/DP/en/GFDP_21_Molke.en.html

3

White Biotechnology: biocatalysing industrial processes

Good wood building: Because wood has low durability, dimensional- and UV-stability, in the building industry, it is replaced in many ranges of applications with other alternative materials such as aluminium, plastics and stone. But wood can rival out these materials, if wood properties are improved by a cross linking of the cellulose fibres effecting in wood material proving a higher durability and dimensional stability.

http://www.wood.uni-goettingen.de/englisch/index_e.html

4

Blue Biotechnology: bioproducts out of the blue

Up jumps a crab with his crooked legs: A valuable polymer can be synthesized from crab waste. Special enzymes from marine microorganisms allow to transfer chitin, a waste product of crab fishery to the biodegradable chitosan, a valuable basic material for food processing, biotechnology or medicine.

<http://www.fh-oow.de/forschung/img/schwsiefert.pdf>

5

Red Biotechnology: health by nature's wealth

The Anti-Aging-Plant: An aqueous extract of Lemon verbena has been produced which contains bioactive ingredients. This extract shows anti-inflammatory activities and scavenges oxygen radicals that else damage human cells e.g. in artherosclerosis or arthritis. In different food products it may be used to promote protection of cells against reactive oxygen species and inflammation processes and results in a protective and finally Anti-Aging-effect.

<http://www.anoximer.de/b>



Bioresource-Technologies

Break bioresource-technology into its root words and you have

- *bioresources* that include genetic resources, organisms or parts thereof, populations, or any other biotic component with use or value for humanity, and
- *technology* — to solve problems or make useful products.

We began using bioresources 10,000 years ago to provide a stable supply of food and clothing.

6

Renewable Raw Materials: Converting biomass

Climatizing bio fibres: The development of a purification process for very fine seed hair fibers, e.g. poplar fibres, made it possible to obtain plant fibers that are much finer than cotton. This purification can also be used for other seed fibres. Those ultra-fine plant fibres have unique climatic properties and can be used for producing comforters but also for high-tech-textiles like outdoor cloth.
<http://www.pappillon.de/Seiten/titelen.html>

7

Microbial genetic resources: making use of the artistry of micro-organisms

Bacterial mini-plants: Man is unable to produce two of the essential amino acids his body needs. But bacteria can. Strains of a soil bacterium have been isolated that produce essential amino acids in a 100fold higher concentration than normal ones promising a significant contribution to the amino acid annual world market of 1.5 x 106 tonnes.
<http://www.fz-juelich.de/ibt/amino>

8

Plant genetic resources: seeding the future

Wild bean into the cup: By assessing the diversity and the economic value of the Ethiopian coffee gene pool and developing concepts of model character for conservation and use of the genetic resources of *Coffea arabica* in its centre of diversity in Ethiopia both the conservation of the montane rain forests as the natural habitat of the wild coffee populations, and the forest coffee systems as the traditional use of the wild coffee populations are fostered.
<http://www.coffee.uni-bonn.de>

9

Animal genetic resources: animal farm revisited

Spider silk from the field: Spider dragline silk is a fiber with remarkable mechanical properties – stronger than steel and more elastic than nylon - that make it attractive for technical applications. Unfortunately, the material cannot be obtained in large quantities from spiders. Therefore transgenic tobacco and potato plants have been generated that express remarkable amounts of these proteins. When produced in plants, the isolated spider fibres exhibit extreme heat stability.

[http://www.nature.com/cgi-taf/DynaPage.taf?](http://www.nature.com/cgi-taf/DynaPage.taf?file=/nbt/journal/v19/n6/abs/nbt0601_573.html)

[file=/nbt/journal/v19/n6/abs/nbt0601_573.html](http://www.nature.com/cgi-taf/DynaPage.taf?file=/nbt/journal/v19/n6/abs/nbt0601_573.html)

<http://www.ipk-gatersleben.de/de/06/03/2001/ipkd0101.htm>



Bionics

Biological systems - characterized by their sensitivity, their high degree of flexibility, their ability to adapt to changing environments, or their high degree of reliability - offer a great range of possibilities to derive engineering principles from natural systems by adapting these principles for the improvement of man-made materials and technological systems - and to do bionics.

10

Construction Bionic: Design lessons from mother nature

Gliding like a skink: Swimming in the sand under a dune is much more exhausting than swimming in the water – but not for Sahara's sandskink. Biological evolution has worked out a solution with minimum solid friction. The surface of the sandskink looks highly polished and its scales have a mechanism to reduce solid friction. The technical imitation of the skink surface gives the chance to develop a new generation of sliding-bearing materials.

<http://www.bionik.tu-berlin.de/institut/xs2skink>

11

Process Bionics: Technical processes inspired by nature

Microcosmal hydro-tech: Hydrogen can be produced steadily by an artificial bacterial algal symbiosis: Purple bacteria produce hydrogen if nitrogen is not available and if green algae provide them with carbohydrates that they produce in surplus during photosynthesis as energy source.

<http://www.bionik.tu-berlin.de/institut/xs2solar>

12

Information Bionics: Learning from communicating and sensing of the wild

Beetle born bio-sensing: A small fire beetle can what engineers are dreaming of: detection of fires by registering finest temperature differences on wide distances by a natural infrared sensor. A functioning prototype has been built that registers warmth radiation like the beetle original.

<http://www.zoologie.uni-bonn.de/Neurophysiologie/home/Schmitz/indexD.htm>

13

Biomimetics: Reading the blueprints of creation

Symbol and sample of purity: The Lotus-Effect, a remarkable link between chemistry, ultrastructure, wettability and contaminability, describes the property of Lotus flowers of self-cleaning to protect from dirt and pathogenic organisms. By applying this property to technical surfaces almost every material in the open air can be cleansed by rain. The 'Lotus-effect' can be easily demonstrated, not only in the sacred Lotus, but also in many other leaves (e.g. cabbage, reeds, indian cress, tulips) as well as in animals (e.g. wings of butterflies and dragonflies).

http://www.botanik.uni-bonn.de/system/bionik_flash_en.html

14

Biomechanics: Technically adapting mechanical properties of organisms

Flying like a bird: Most of the birds soaring over land show characteristically slotted wing-tips. The feathers of the hand or, winglets bend up and become staggered in height. The multiple-winglet configurations are reducing the induced drag – also important to improve flight efficiency of planes.

<http://www.bionik.tu-berlin.de/institut/xs2vogel>



Ecosystem-Technologies

Ecosystem-technologies use technical equipment for ecosystem management. This management is based on profound understanding of ecosystem functioning and tries to reduce costs for measures taken and to minimize consequences harmful to the environment.

15

Biogeochemical Cycling: Capturing climate gases

Restoring peats for storing climate gases: Among other tracegases, nitrous oxide is contributing to global warming. Rising temperatures accelerate the nitrogen turnover and high soil water contents increase denitrification and nitrous oxide production. The restoration of formerly drained peatlands, however, can reduce the atmospheric load of trace gases.

<http://www.iboe.org/kamp/fretex>

16

Ecosystem Restoration: Nature regained

Let rivers run: By dyke relocation 400 ha of floodplain ecosystem could be restored and complex multi-sectoral goals (nature conservation, flood prevention, regional development), and cross-sectoral link-ages were reached.

http://www.lottostiftung.de/2002/zuku/umweltnat_07.htm

17

Ecological Engineering: Linking into the eco-matrix

Grassland creation from arable fields: By hay transfer, top-soil removal, sowing and planting of rare grassland species former arable fields have been ecologically engineered to develop them to species-rich calcareous grasslands.

<http://www.welhenstephan.de/vegock/engindex.html>

18

Life Support Systems: Imitating the life of the biosphere in engineered systems

Exporting life into the space: An artificial aquatic ecological system has been developed for space-flight: This minimodule, a closed aquatic ecosystem, was the first artificial aquatic ecosystem containing vertebrates, invertebrates, higher plants and microorganisms self-sustained by its inhabitants only that participated in a spaceflight.

http://www.ruhr-uni-bochum.de/tierphys/HPAndriske_e.html#Research%20interest

19

Eco-Management: Management plans of the ecological kind

Manage to make things better: Overgrazing and in the consequence soil destruction and desertification are severe problems in parts of Argentinean grasslands: counteracting occurs by management plans, rotation principles, adapted production technology.

<http://www.internationales-buero.de/arbeitsfelder/wtz/Amerika/Argentinien?pro=YES#apList>



Biodiversity Sound-Technologies

Biodiversity sound-technologies is a corollary of environmentally sound technologies, as defined in Agenda 21. They should protect biodiversity, are less polluting, use biological resources in a more sustainable manner, recycle more wastes and products and handle residual wastes in a more acceptable manner than the technologies for which they were substitutes.

20

Biodiversity sound energy technology

Solar Sisters: The resource-poor Nepal nearly applies a fourth of its income in foreign currencies for the import of fossile energy. Three quarters of the energy consumption are covered by wood. By that man is devastating his basis for living. The forest cover has been drastically reduced. Installation of Solar Home Systemes in distant regions of Nepals both provides sustainable energy supply and preserves biological resources.

<http://www.fht-stuttgart.de/fbp/fbpweb/sonstiges/nepal.shtml>

21

Biodiversity sound chemical production

Paints no longer pain: Efficient use of biodiversity environmentally friendly paints and coating processes in ship newbuilding. New paints developed by paint manufacturers to limit emissions caused by organic solvents require new optimized surface preparation and application technologies to gain both less hazards to the workers and the environment as well as increased productivity and high quality in the shipyard.

http://www.ecopaint.net/ohne_js/index.htm

22

Biodiversity sound waste technology

Bioplastics - plusses for the environment: Production of plastics that are biodegradable and do not add to the CO₂ balance of the atmosphere. Many bacteria produce the biopolymer PHB in large quantities as storage material (instead of fat, oil, or starch). PHB has thermoplastic properties. It is not toxic and it is totally biodegradable. Processed PHB can be handled on plastics machines the same way as classic plastics produced from oil.

<http://www.biomer.de/IndexE.html>

23

Biodiversity technologies for poverty alleviation

Biodiversity empowers the poor: By the Programa Desarrollo Rural Sostenible (PDRS) that mediates sustainable management tools including regional planning and protected area management the sustainable use and conservation of biodiversity will be linked to the alleviation of poverty due to unsustainable land management.

<http://www.gtz-rural.org.pe/tic>



Biodiversity Technologies and the CBD: Thematic work programmes

Thematic work programmes address certain types of ecosystems. Each thematic programme establishes a vision for future work, defines guiding principles and key issues, identifies potential outputs and suggests time-tables. The implementation of the programmes includes biodiversity technologies.

24

Technologies for Agrobiodiversity

Optimised production of tropical crops: The benefits of smallholders' mixed farming systems are maximised by making use of the complex above- and below ground interactions between crops, trees, weeds and insects. Increasing the efficiency of organic matter recycling and the mobilisation of soil borne nutrients that prevent soil erosion by wind and water and increase dinitrogen fixation by legumes.

<http://www.wiz.uni-kassel.de/ink/fts/en/index.shtml>

25

Technologies for Biodiversity of Dry and Sub-Humid Lands

'Zai' fights dry: By 'Zai', a traditional method for the restoration of land from Burkina Faso, degraded dry lands can be restored and soil fertility reestablished.

<http://www.zef.de>

26

Technologies for Forest Biodiversity

Djungle back: Degraded areas formerly used by agriculture or livestock in the Amazon basin are restored by spreading of topsoil from freshly cleared primary forests and plantation of local tree species. Plots planted under that method showed a significantly accelerated growth of planted trees and a rapid soil coverage by spontaneous natural regeneration by species from 22 tree families.

http://www.gtz.de/toeb/pdf/TOEB_Pflanzensukzession_auf_unterschiedlich_rehabilitierten_Flaechen_im_Zentralamazonasgebiet.pdf

27

Technologies for Mountain Biodiversity

Monitoring mountains nature: Since 1984 the Alpine national park Berchtesgaden has elaborated a geographical information system on the base of coloured infrared images with derived data modelling systems and user interfaces for the routine use.

<http://www.nationalparkforschung.de>

28

Technologies for Marine Water Biodiversity

Coastal potentials: Exploring mangroves, coral reefs, estuaries and the coastal seas in Indonesia for implementing sustainable aquaculture technologies.

<http://www.zmt-bremen.de/files/main.php?language=en&a=proj&ID=21&deep=3&start=1>

29

Technologies for Inland Water Biodiversity

Modelling tropical flooding: Development and application of the flood pulse concept, a holistic approach for a general description of the structure and function of Central Amazonian floodplains. The concept states that biotic and abiotic processes in the Aquatic-Terrestrial Transition Zone (ATTZ) are primary regulators of species composition, food webs and nutrient dynamics.

<http://www.mpil-ploen.mpg.de/mpilalg.htm>



Biodiversity Technologies and the CBD: Cross-cutting

Cross-cutting issues are of relevance for all thematic programmes as they try to bring cohesion to the work of the CBD and provide substantive bridges or links between the thematic programmes. Implementation measures in different ecosystems include biodiversity technologies.

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Technologies for protected areas

Natural and cultural heritage: Promoting conservation measures and sustainable methods of cultivation in the Himalaya region. Together with the multi-ethnic population environmental education units are elaborated and implemented while at the same time land use systems are optimized always taking into account their traditional knowledge.

<http://www.gtz.de/biodiv/english/china-yunnan.html>

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Technological Solutions Regarding Bioprospecting and Accessing Biogenic Resources

Good prospects from nature: Identification of pharmacologically active substances from Argentinian plants and endophytes.

<http://www.internationales-buero.de/arbeitsfelder/wtz/Amerika/Argentinien>

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Technologies to Regulate or Control the Risks Associated with the Use and Release of Living Modified Organisms

Mobile genes: Analyzing the gene mobilizing potential of microorganisms in the nutrient-rich habitat activated sludge. Isolating and genetically characterizing conjugative plasmids of endogenous microorganisms and studying gene transfer in a model sewage plant.

<http://www.genetik.uni-bielefeld.de/Genetik/safe>

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Technologies to Regulate or Control the Risks Associated with the Introduction of Alien Species

Fighting bad aliens with good aliens: Integrated control of the accidentally into East and West Africa introduced Larger Grain Borer in farmers' stores in Togo, Kenya, Benin, Ghana and Guinea by biological control using a natural enemy imported from the pest's home country.

<http://www5.gtz.de/gate>

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Technologies for Scientific and Technical Education to Promote the Understanding of the Importance of Biodiversity

Empowering rural people: Establishing a decentralised, independent, demand driven and economically sustainable information system for the benefit of rural development.

<http://www.runetwork.de>

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Technologies for Monitoring Biodiversity

Indicating bio-states: Mediating suitable methods for biological monitoring of the environment and pollution levels; monitoring approaches which could be used in future to identify and give greater consideration to ecological restraints that must be obeyed by development projects.

<http://www5.gtz.de/gate>



Ecosystem approach

The Ecosystem Approach is a strategy for the integrated or holistic management of resources through modern scientific adaptive management practices. It is the fundamental paradigm for activities under the CBD, including technology transfer.

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Functional relationships and processes within ecosystems

Forging forces of forests: BLUMEN is the acronym of a spatial reference system allowing to evaluate the status of forest fragments, to classify forest and land use from montaneous coastal rain forest to the coast, to analyse the ecological and economic effects of land use systems, to develop an assessment framework for decision-making for regional development and to create participative concepts for corridor planning and management.

<http://www.it.fh-koeln.de/blumen>

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Enhancing benefit sharing

Pro indigenous' benefits: Process-oriented approach to develop a participatory and just benefit-sharing under incorporation of traditional communities when using biological resources (ProBENEFIT).

<http://www.dlr.de/pt/umwelt/f70000/f73000/Vorhaben%2001LM0203-05/PRO-Benefit-Koordinierung.htm>

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Using adaptive management practices

Seeding and sowing on saline soils: Criteria have been established for the production capacity, optimum management and preservation of dyked young saline soils in Zhejiang Province using the 'chronosequence approach'. The criteria allow to develop and monitor a dynamic agroforestry system.

http://www.forschung-cdrom.rek.tu-dresden.de:6336/dynaweb/fakstrukt/transfer_2003/@Generic__BookTextView/378970;cs=default;ts=default

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Carrying out management actions at the appropriate scale

Local women save global goods: While promoting local knowledge of conserving agricultural biodiversity, in particular food and medicinal plants, from a gender perspective, it is aimed to enhance food security. On traditional rural fairs and village workshops exchange of the collected data takes place. Once collected, the traditional knowledge of women and men shall be disseminated and used on a national level.

<http://www.gtz.de/biodiv/english/peru-gender.html>

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Ensuring intersectoral cooperation

Across professions and across the ocean: Management and use strategies of endangered remnants of the Brazilian Atlantic forest have been developed. These strategies are based on interdisciplinary research and provide a long-term vision. The application of scientific results should improve the efficiency of measures to protect the biodiversity and thereby provide an ecological basis for regional landscape planning, in order to promote the persistence and regeneration of the typical biodiversity within this region.

<http://www.mata-atlantica.ufz.de>