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elni REVIEW

CONTENTS

Editorial

The main topic of this issue of the elni Review is the *Convention on Biological Diversity (*CBD). The ninth meeting of the Conference of the Parties (COP 9) will be hosted by Germany and held in Bonn from 19 to 30 May 2008. The global community will discuss measures against the ongoing destruction of biodiversity as well as ways towards a fair and responsible use of genetic material. The issues for in-depth consideration include:

– Agricultural and forest biodiversity
– Global strategy for plant conservation
– Invasive alien species
– Ecosystem approach
– Progress in the implementation of the strategic plan and progress towards the 2010 target and relevant Millennium Development Goals.

Non-Governmental Organisations take great interest in the success of this process and have made a number of recommendations to the negotiating parties.

The COP 9 issues are discussed in several articles in this issue: "Agrobiodiversity" is still an unknown quantity for most people, observes *Franziska Wolff*. Her contribution provides background information on the loss of agrobiodiversity and discusses recent international policy developments as well as the challenges that lie ahead pertaining to a reversal of this trend.
Monika Brinkmöller asks "Will the CBD fulfil our expectations?" Her article considers whether the acronym CBD also stands for "Conserving Biological Diversity" in a fair and responsible manner.

Another important topic is the "Access to Genetic Resources and the fair and equitable sharing of the benefits that result from their use", which is analysed by *Susette Biber-Klemm.* Furthermore, *Hartmut Stahl* discusses the environment programme for the UN Conference on Biological Diversity in this issue.

'Biodiversity damage' liability as laid down in the Environmental Liability Directive is the topic of the contribution by *Volker Mauerhofer*. He scrutinises the definition in the Directive and its distinction from more stringent EU, international and national norms.

In the context of the "Better Regulation" initiative on the EU level, *Jochen Gebauer* takes a look at the the economic cost of environmental legislation. From an environmental law perspective, he discussdes whether the German standard cost model measurement can contribute to the EU action programme in terms of the reduction of administrative burdens.

Finally, *Birgit Dette* elaborates on the Alpine Convention as an international agreement with widespread dimensions.

Last but not least, the "New Books" column presents a review of the the second edition of the Negotiator's Handbook on "Multilateral Environmental Agreements" by *Simone Hafner*.

The next issue of the *elni review* will focus on Environmental Impact Assessment and the Revision of the IPPC Directive. Please send contributions on this topic as well as other interesting articles to the editors by the end of June 2008.

Martin Führ
March 2008

elni forum
Producer responsibility and WEEE revision

takes place on Thursday, May 15, 2008, at 6 p.m.,
at the ***Facultés universitaires Saint-Louis,***
Boulevard du Jardin botanique 43 (Metro Botanique/Rogier), 1000 Brussels, Salle du Conseil, 4th Floor, at the invitation of CEDRE (Environmental Law Study Center)

Enforcement of individual producer responsibility through (smart) Labelling of electric and electronic products?
with an introduction by
Gerhard Roller, University of Applied Sciences Bingen/I.E.S.A.R
Martin Führ, University of Applied Sciences Darmstadt/sofia

The state of revision of the WEEE-Directive
with an overview by
Kurt van der Herten, European Commission

Gerhard Roller and Martin Führ will present results of a research project that has been carried out by three Universities (Darmstadt, Pforzheim and Bingen) and funded by the German Ministry of Education and Research.

Please confirm your participation by e-mail to cedre@fusl.ac.be

Agrobiodiversity on the agenda

Franziska Wolff

With the 9th Meeting of the Conference of the Parties to the Convention on Biological Diversity's coming up, the debate on biodiversity is spilling over from the circles of the 'usual suspects' to a broader public. Agricultural biodiversity, or 'agrobiodiversity', as an important component of biological diversity, however, remains an unknown quantity for most people. It means the variety and variability of farm animals and cultivated plants as well as the agroecosystems in which they thrive. Starting out with some background information on the loss of agrobiodiversity, this contribution goes on to discuss recent international policy developments and the challenges that lie ahead pertaining to the reversal of this trend.[1]

1 Loss of diversity due to agricultural intensification

The dramatic decrease in agrobiodiversity represents a constantly worsening global environmental problem.[2] Agrobiodiversity is the part of biodiversity that in the context of agriculture contributes to nutrition (agricultural crops, productive livestock), livelihoods (delivery of raw materials, medical plants, animals used for transport, etc.) and the maintenance of habitats. The term covers three dimensions: the genetic diversity between and within crop varieties and livestock breeds/lines, the diversity of species and that of agroecosystems. Agrobiodiversity is the result of human interaction with nature through breeding and farming. It is also the result of specific societal patterns to solve the problem of food and raw material supply. They are based on the *diversity* of agricultural management practices and of the comprehensive socio-economic organisation.[3]

The loss of agrobiodiversity is an insidious problem: The majority of the world's food supply today is based on only 10 cultivated plants.[4] It is estimated that the plant genetic resources (PGR) that are currently being actively cultivated represent only 25% of the worldwide diversity that was in use at the beginning of the 20th century. While in the Global South a great deal more plant genetic diversity and traditional varieties are still available 'on farm', in an industrial nation like Germany the disappearance of species, plant varieties and gene complexes ('genetic erosion') is estimated to reach up to 90%.[5] Low variability in crop rotation and a high standardisation of management practices are associated with these trends. The situation is similar with regard to farm animals: the UN Food and Agriculture Organisation (FAO) warns that an average of two farm animal breeds disappears every week. Approximately half of the breeds present in Europe at the turn of the 20th century have disappeared forever. In Germany, of at least 35 original cattle breeds, only 5 have remained. The everyday use of almost all species is dominated by very few breeds: Just 14 of the approx. 30 domesticated mammalian and bird species provide 90% of human food supply from animals.[6] Within these species in use, very few breeds and lines dominate: Holstein Frisian cattle are, for example, spread globally and on a big scale. And within this breed very few top bulls dominate, 'producing' up to a million descendents.

The causes for the loss of agrobiodiversity are manifold.[7] Above all, agricultural intensification and a preference for a few high-performing but genetically homogenous crop varieties and farm animal breeds have driven the marginalisation of traditional production systems and of associated local seeds and breeds. Apart from market demands and technological developments, contract production, global trade liberalisation, agricultural subsidies promoting the development of large-scale production as well as seed, breeding or marketing legislation have been driving the trend towards homogenisation. Disease epidemics and disasters like droughts, floods or military conflicts are also an issue.

Why is agrobiodiversity loss problematic at all? First, in terms of the *environment*, the loss of locally

1 Note that this article focuses on 'planned agrobiodiversity' as opposed to the 'associated agrobiodiversity' of wild relatives, pollinators, symbionts, pests, parasites, predators, competitors and neighbouring habitats that also have a function for agriculture. Cf. Vandermeer, J. H./Perfecto, I. (1995): Breakfast of biodiversity: The truth about rainforest destruction. Oakland.

2 FAO (1996), Report on the State of the World's Plant Genetic Resources for food and agriculture, prepared for the International Technical Conference on Plant Genetic Resources Leipzig, Germany 17–23 June 1996; FAO (2007), The State of the World's Animal Genetic Resources for Food and Agriculture, edited by Barbara Rischkowsky & Dafydd Pilling. Rome.

3 Almekinders, C./Fresco, L./Struik, P. (1995): The need to study variation in agroecosystems. Netherlands Journal of Agricultural Science 43: pp. 127-142; Brookfield, H. (2001): Exploring Agrodiversity. New York: Columbia University Press.

4 FAO (2000): Food Security. http://www.fao.org/biodiversity/sd/foodsecur.asp (September 2000).

5 TAB (Büro für Technikfolgenabschätzung) (1998): Gentechnik, Züchtung und Biodiversität. TAB-Arbeitsbericht Nr. 55, Bonn.

6 FAO (2004): Loss of domestic animal breeds alarming. Press report, 31 March 2004.

7 See FAO (1996), FAO (2007) (both infra, Footnote 2) and IÖW/ Öko-Institut/ Schweisfurth-Stiftung/ Freie Universität Berlin/ Landesanstalt für Großschutzgebiete (eds.) (2004): Agrobiodiversität entwickeln! Handlungsstrategien für eine nachhaltige Tier- und Pflanzenzucht. Endbericht, Berlin. Available at: www.agrobiodiversitaet.net.

adapted, robust varieties and breeds impacts on the surrounding eco-system and wild biodiversity. Their substitution by genetically homogenous high performance crops and animals (kept in high-tech sheds) makes necessary non-ecological inputs such as fossil energy, fertilizers and pesticides, feed supplements and pharmaceuticals. Despite lower productivity, their utilisation is valuable, among other things because the crops and breeds frequently possess qualities important for low-input, sustainable agriculture such as disease resistance and tolerance of climatic extremes. Generally, agrobiodiversity loss undermines the foundations of future breeding. This is especially problematic in the context of climate change, because of which agricultural crops and farm animals will need to be adapted to new climatic conditions that are not fully predictable.

Second, agrobiodiversity loss has *economic impacts*: Monotony in the fields increases vulnerability to, for instance, insect pests, diseases and climate stress that can devastate a uniform crop, especially on large plantations. A famous example was the 19th century Irish potato famine. Similarly, lacking genetic diversity of farm animals impedes adaptation to diseases, parasites, or variations in the availability and quality of food. Thus, agrobiodiversity loss increases the economic risks for farmers and the food business.[8]

Finally, there are substantial *social impacts*: Agrobiodiversity is 'the product of the ingenuity of women and men whose knowledge and skills over millennia have crafted myriad varieties and breeds adapted to a multitude of ecosystems and suited to every social, cultural and economic need.'[9] Along with soil and water, it secures the existence particularly of smallholder and subsistence farmers. It is also the foundation of world food security.[10]

2 Recent international policy developments

Governments have recognised rather late and reluctantly that the loss of agricultural biodiversity is problematic and needs to be tackled politically. In the following, we will describe recent relevant policy developments at international level.

2.1 Agricultural biodiversity in general: The CBD

The objectives of the Convention on Biological Diversity (CBD) to conserve and sustainably use biodiversity as well as the CBD's 2010 target apply to all forms of biodiversity. This includes agricultural biodiversity, both its 'bred' components (crops, farm animals) and its associated components (wild relatives, pollinators, soil organisms, etc.). Recognizing the 'special nature of agricultural biodiversity, its distinctive features, and problems needing distinctive solutions', the parties to the CBD in 1996 decided to establish and in 2000 endorsed a multi-year programme of work on agricultural biological diversity (CBD Dec. V/5). The programme was developed by the UN Food and Agriculture Organisation (FAO) in collaboration with the CBD Secretariat, using the Ecosystem Approach as a framework. Over the years, specific cross-cutting international initiatives were set up on pollinators, soil biodiversity and on biodiversity for food and nutrition.

Highly relevant to the future use of crop diversity are the COPs' decisions on 'genetic use restriction technologies' (GURTs). These are genetic engineering technologies applied to switch on or off the expression of a plant's genetic traits.[11] Initially developed by the seed and agrochemicals industry and the US government, such 'terminator technologies' shall for commercial reasons restrict the 'unauthorized use'[12] of genetic material – i.e. the re-planting of harvested seed. Since over 1.4 billion people in the world depend on farm-saved seed this is regarded as a major threat to food security. In 2006 the CBD parties reconfirmed an earlier decision and recommend against the field testing or commercialisation of such seeds.

At the upcoming 9th meeting of the CBD's Conference of Parties, an in-depth review of the programme of work on agricultural biological diversity is scheduled. In preparation of this review, the CBD's scientific body developed a number of recommendations in February 2008 (SBSTTA Rec. XIII/1). Regarding existing programme elements, however, these recommendations rarely go beyond the status quo and do not even tackle the deficits (e.g. with regard to adaptive management) pointed out in the FAO assessment[13] that fed into the process. With regard to emerging issues, in particular the links between agricultural biodiversity, climate change and biofuels, the text is still heavily bracketed. This reflects disagreement about the role of climate change adaptation versus mitigation and between European countries and biofuel producers about the necessity of acting on the problematic impacts of biofuels on biodiversity – beyond collecting and disseminating information. While some governments had even sought to delay discussion of biofuels for further years, a number of environmental and development NGOs demand a

8 Thrupp, L. A. (1997): Linking biodiversity and agriculture: Challenges and opportunities for sustainable food security. World Resources Institute, Washington.

9 Mulvaney, Patrick (2007), Food Providers Hold the Key – CBD has the mechanism. In: ECO Vol. 21 Issue 1, 18 Feb 2007.

10 Food security means a state 'when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life', Declaration of World Food Security, Rome 1996.

11 They either render the subsequent generation sterile (v-GURTs) or require external application of inducers to activate a trait's expression, e.g. for insect resistance (t-GURTs).

12 CGRFA-9/02/17 Annex Rev. 1: 2.

13 UNEP/CBD/SBSTTA/13/INF/2.

complete abstention from biofuel production. On the whole, SBSTTA failed to call into question the intense agricultural production and trade paradigm with its carbon-consuming, polluting and (agro)biodiversity-destroying practices. Neither does it call strongly on the UNFCCC climate regime to take into account agricultural biodiversity concerns.

2.2 Crop diversity: The International Treaty on Plant Genetic Resources

Apart from the CBD, there are other international agreements, fora and policies that deal with individual components of agricultural biodiversity. With regard to the diversity of plant genetic resources for food and agriculture (PGRFA), this includes above all the Commission on Genetic Resources (CGRFA) and the International Treaty on Plant Genetic Resources for Food and Agriculture (International Treaty or ITPGR for short). Both are under the auspices of the FAO.

The *Commission on Genetic Resources*, established in 1983, is an intergovernmental mechanism mandated to negotiate matters relevant to genetic resources for food and agriculture. Traditionally, its focus has been on plant and – more recently – on animal genetic resources, too. Only at its 2007 session did the Commission adopt a ten-year multi-year programme of work, which covers *all* components of agrobiodiversity, i.e. plant, animal, aquatic and forest genetic resources, micro-organisms and invertebrates relevant to food and agriculture as well as a range of cross-sectoral matters. This widening of its activities on the one hand underscores a gradual shift towards a more ecosystem-based view of agrobiodiversity. On the other hand, it reflects the emergence of a new forum addressing the Commission's old remit of plant genetic resources: the International Seed Treaty.

The *International Treaty* was negotiated under the CGRFA in order to harmonise with the CBD, an earlier, non-binding 'International Undertaking' on crop diversity. After eight years of difficult negotiations, it entered into force in 2004. Apart from committing its 116 contracting parties to the conservation and sustainable use of plant genetic resources for food and agriculture, it establishes a multilateral system of access and benefit sharing for a number of food crops and forages. Up to 1992, biological resources were considered a 'common heritage' or public good, and access to them had been unrestricted. The CBD had then established a regime of national sovereignty over (all kinds of) genetic resources and requires the establishment of conditions of access to genetic resources and the fair and equitable sharing of the benefits arising from their utilisation (Art. 15 CBD). The bilateral access regime between 'countries of origin' and resource users that had been established for genetic resources of 'wild' biodiversity, however, did not fit for agricultural genetic resources. Over millennia, these have been exchanged for breeding purposes between regions, with the result that the 'country of origin' concept is not applicable. The international community therefore developed an alternative, multilateral access and benefit regime for PGRFA under the International Treaty (Art. 10 ITPGR). This Multilateral System consists of 35 food crops and forages listed in the Treaty's Annex I for which the contracting parties will provide facilitated access.[14] 'Facilitated access' means that an exchange free of charge or for a minimum fee may take place for breeding, research and agricultural training, but not, however, for industrial purposes (Art. 12.3 (a) (b) IT). The respective genetic material belonging to public institutions – mostly national and international[15] gene banks – remains in the public domain.

A Standardised Material Transfer Agreement (SMTA), adopted at the first meeting of the Treaty's Governing Body[16] (Madrid 2006), specifies the details of access and benefit-sharing. It is the basis for private contracts between the providers (mostly gene banks) and users of PGRFA (e.g. breeders). When users commercialise a product from material accessed through the Multilateral System and such a product is not available without restriction to others for further research and breeding (because it is protected by Intellectual Property Rights), they have to pay 1.1%[17] of the products' gross sales, less 30% (Art. 6.7 SMTA), into a multilateral trust account to support the Treaty's objectives. In the SMTA negotiations, developing countries agreed to this rate only after a wide definition of what actually constitutes a 'product' had been adopted. The definition requires that the PGRFA physically incorporates material received through the Multilateral System. This incorporation however need not add commercial value to the PGRFA. A 'third party beneficiary' (filled in by FAO) is to monitor transfers of material and to initiate dispute settlement between PGRFA providers and recipients.[18] In the year after adoption of the SMTA, more than 90,000 transfers of Annex-I material have taken place under these new access and benefit-sharing conditions – a large number between the international gene bank collections of the Consultative Group on International Agricultural Research.

Further core elements of the International Treaty include its provisions on Intellectual Property Rights

[14] Other PGRFA fall under the bilateral system of the CBD.

[15] International gene banks are to a large extent affiliated with the Consultative Group of International Agricultural Research (CGIAR).

[16] The Governing Body sessions are equivalent to a conference of parties.

[17] 0.5% for a discounted rate according to Art. 6.7 SMTA, respectively. The levels of payment will be reviewed periodically (Art. 13.2(d)ii).

[18] Contrary to the demands made in the negotiations of many developing countries, the third party beneficiary is not entitled, however, to receive information about intellectual property rights obtained by recipients of material from the Multilateral System.

(IPRs),[19] on Farmers' Rights and on the sustainable use of PGRFA. With regard to the application of IPRs on Annex-I material, the Treaty stipulates that "recipients shall not claim any intellectual property or other rights that limit the facilitated access to plant genetic resources for food and agriculture or their genetic parts or components, *in the form received* from the Multilateral System" (Art. 12.3 d ITPGR, italics added). This ambiguous language reflects, on the one hand, the concern of developing countries and civil society which sought to avoid that material from the Multilateral System or parts and components of it (e.g. resistance genes) can be protected by IPRs. They can impede traditional farmers' practices such as the resowing of farm-saved seed and hence undermine the Treaty's commitment to the sustainable use of agrobiodiversity. On the other hand, the words "in the form received" could leave open the possibility of IPR claims on isolated, purified or genetically modified genes and on derived materials. Thus, industrialised countries' practices to take out IPRs on plants were not fundamentally challenged. A further tricky aspect is that commercial benefit-sharing is only obligatory when research of and breeding with products developed from MS material is restricted by IPRs (see above). Hence, there is an implicit mechanism to make IPRs more acceptable as they contribute to funding the Treaty's objectives.

The concept of Farmers' Rights was originally developed – largely by civil society organisations – to give recognition to the contributions of farmers and communities in collectively conserving, improving, and making available plant genetic resources. Its ultimate purpose was to countervail the application of IPRs on farmer and community seeds (collected to a large extent in developing countries) through commercial seed companies (based in industrialised countries). Only a downsized version of the holistic concept of Farmers' Rights as suggested by NGOs was codified in the International Treaty. It now includes the protection of traditional knowledge relevant to plant genetic resources for food and agriculture, the right to equitably participate in sharing benefits arising from the utilisation of PGRFA, and the right to participate in making decisions, at the national level, on matters related to their conservation and sustainable use (Art. 9.2 ITPGR). The right to re-use and freely exchange farm-saved seed (the so-called 'farmers' privilege') is not included. The responsibility for implementing Farmers' Rights is entrusted to the nation states. A call to develop *inter*national guidelines for implementing Farmers' Rights was voiced early and repeatedly at the 2007 meeting of the Treaties' Governing Body. It was, however, rejected by most industrialised countries. Governments merely adopted a Resolution (2/2007) drafted by the G-77 and China to compile views and experiences on implementing Farmers' Rights and to consider these at the next session. The resolution explicitly mentions that farmers' organisations should, where appropriate, be included into this compilation of experiences.

While the parts of the International Treaty relating to the conservation of and access to 'ex-situ' (gene bank) resources are de facto in the political limelight, the Treaty does also contain a strategy on the sustainable use of plant genetic resources for food and agriculture (Art. 1 and 6, ITPGR). Highlighting the dimension of sustainable use in addition to that of conservation has been a major achievement of the 1996 Global Plan of Action on Plant Genetic Resources,[20] and was taken up in the International Treaty. Rather than breeding just from the diversity conserved in seed banks, sustainable use means actively employing in agriculture (i.e. 'on farm') a broad range of genetically diverse, locally adapted varieties and species, including underutilised ones. Only active use ensures that crops can naturally adapt to environmental changes and only crop diversity *in the fields* can provide ecosystem benefits. However, implementing a sustainable use strategy is difficult especially in countries with industrialised agriculture: it is intrinsically linked to the diversity of farming systems and practices, and to the local control of farmers over the use and development of agricultural biodiversity. Hence, it requires a major (economic, legal, institutional) transformation of industrial production systems.[21] This is too controversial an issue for many countries that still regard their high input/high output agricultures as basically successful; as a result the discussion at the 2007 session of the International Treaty on the state of implementation of sustainable use strategies remained rather shallow.

Finally, let us take a look at the Treaty's funding. This is of course a crucial issue and, at present, a highly contentious one. The Treaty's funding strategy (Art. 18 ITPGR) encompasses above all voluntary contributions from contracting parties, resources provided through the FAO's Regular Programme, and – to a probably relatively small extent – the revenues arising from commercial benefit-sharing. However, the outlook is bleak: after contracting parties had contributed only sparsely to the 2006/07 budget, adoption of the 2008/09 budget was seriously endangered by massive haggling over contracting party contributions. In the end, the budget to at least operate the Treaty's

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19 IPRs relevant for PGRFA include Plant Breeders' Rights and patents. The latter are more contentious because they confer far more exclusive rights on rights-holders than Plant Breeders' Rights. Also, awarding a patent on living matter implies that, for instance, the isolation of a gene qualifies as an 'invention' rather than a 'discovery'.

20 Global Plan of Action for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture. The Plan was adopted at the International Technical Conference on Plant Genetic Resources, which FAO convened in Leipzig in 1996.

21 See IÖW et al. (2004) (Footnote 7 infra).

Secretariat was granted, and a few countries voluntarily provided additional means. However, parties could not agree on rules for the reliable longer-term funding of the Secretariat. Furthermore, there was no consensus on providing funds for the monitoring of SMTAs to ensure equitable benefit-sharing. Neither were means made available in the nearer future for on-farm seed conservation through farmers or for capacity building in the global South. The fact that funds are available for the ex-situ conservation of seed in gene banks – through the Global Crop Diversity Trust[22] – shows the persistent imbalance between an ex-situ vs. sustainable use strategy on crop diversity. The latest and certainly impressive example of such an ex-situ strategy is the Norwegian-funded construction of a 'Global Seed Vault' in arctic Svalbard which shall serve as a safety net for seed banks.

2.3 Farm animal diversity: The Global Plan of Action

The diversity of farm animals has moved up the international agenda only rather recently. In 1993, FAO's Commission on Genetic Resources (see above) first launched the 'Global Strategy for the Management of Farm Animal Genetic Resources' to guide efforts on preventing the erosion of farm animal diversity. Five years later, the FAO Commission initiated a process to collate a comprehensive State of the World's Animal Genetic Resources report.[23] The 2007 International Technical Conference on Animal Genetic Resources in Interlaken, Switzerland, marks the highlight of international AnGR politics to date. Apart from presenting the State of the World report, the conference resulted in the adoption of a 'Global Plan of Action' (GPA) on Animal Genetic Resources (AnGR) which replaces the earlier 'Global Strategy'.

The GPA on Animal Genetic Resources is a policy document that shall guide national policies as well as donor funding. Its goal is to promote the sustainable use, development and conservation of animal genetic resources. Modelled on an earlier Global Plan for crops, signatory states commit themselves to action in four strategic priority areas: 1) the characterisation and inventory of AnGR and monitoring of trends and associated risks; 2) sustainable use and development; as well as 3) conservation of AnGR; and 4) policies, institutions and capacity building related to AnGR.

On the positive side, the Global Plan of Action puts AnGR on the international agenda, based on a good analysis of the drivers behind the destruction of farm animal diversity in the State of the World report. Some of its commitments are indeed crucial. It will provide a benchmark against which the future developments and implementation can be assessed so that pressure for action is created. The Plan, however, is not legally binding and lacks a funding strategy up to now. While some programme support is expected from FAO, both state and private contributions into a Trust Account are voluntary and concrete promises on additional and obligatory international funding were not made in Interlaken. Apart from the GPA's rather weak implementation and financing structure, there are a couple of substantive drawbacks. Firstly, while the concern about problematic breeding strategies of commercial breeds is mentioned briefly, it was not translated into a strategic priority. Moreover, the wider context of industrial livestock husbandry is hardly tackled, although the State of the World report points to it as the major cause of AnGR loss. Individual AnGR programmes cannot be successful if the industrial production paradigm itself remains unquestioned and is actually being exported to developing countries. Secondly, during the negotiations the reference in the draft GPA to the concept of Livestock Keepers' Rights was watered down. Livestock Keepers' Rights are a notion which civil society had introduced in analogy to the Farmers' Rights in the ITPGR. It encompasses 'a bundle of rights that includes rights to grazing, water, markets and participation in policy decision making as well as rights to the genetic resources of their animals.'[24] Such rights might protect the breeding and production conditions under which local communities, farmers and pastoralists have developed and maintained farm animal diversity over centuries. While the Global Plan of Action recognizes the contribution of these stakeholder groups to agrobiodiversity, a number of developed countries rejected anchoring Livestock Keepers Rights in the document as a means to safeguard this contribution, arguing that the concept and intended legal status of the rights were not yet fully clear.[25] Finally, while the GPA itself is relatively balanced in its priorities, it remains to be seen what activities will actually be carried out. In the past, a tendency at least in Europe could be observed to channel funds into characterisation, inventory and monitoring rather than directly into sustainable use and conservation programmes. As regards the balance between use and conservation activities, ex-situ (cryo-) conservation has been much less common for AnGR than for crops. The new focus on this (partly quite expensive) option shows that the interest of developed countries in large part lies with maintaining genetic diversity for breeding rather than with keeping many locally adapted breeds 'on farm' to preserve biodiver-

22 While the Trust is an independent international organisation that receives donations from governments and the private sector, its policy framework is provided by the ITPGR.

23 FAO (2007) (see Footnote 2 infra).

24 Mulvany, Patrick/ Gura, Susanne (2007), Reclaiming livestock keepers' rights. In: Seedling, January 2007.

25 In the final negotiations, contentious issues were resolved by a 'balance' between developed country interests in avoiding references to Livestock Keepers '*Rights*', developing country demands for relatively concrete language on funding, and the call of agricultural exporting countries to avoid trade language ('incentives') in relation to AnGR support measures.

sity and render agriculture more sustainable. The success of this (basically very valuable) policy document depends largely on the concrete national efforts as well as on the provision of international funds and the follow-up process within the FAO.

3 Challenges ahead

We showed in the above sections that global agrobiodiversity loss has led to the need for international political action, and that some political action has already resulted. In this paragraph, we will conclude the article by pointing to a couple of challenges for agrobiodiversity protection that face policy-makers. These include policy developments, agricultural production trends as well as ecological challenges, especially climate change.

With regard to *policy development*, we will focus on international policies on intellectual property rights. Promoted by the breeding and biotechnology industries, both Plant Variety Protection (PVP) and patents have been strengthened and expanded in scope over the past years. Plant Variety Protection is an IPR on seed varieties, which gives breeders rights over protected varieties. As PVP still allows use of these varieties for breeding purposes, it is less exclusive than patents, which allow for less use of a protected invention without the consent of the holders of the rights. Changes made in 1991 to the Agreement of the International Union for the Protection of New Varieties of Plants (UPOV-91), however, tightened the PVP regime, too: the monopoly right was extended from covering propagating material to covering the harvest, the term of protection was prolonged and the combination of Plant Variety Protection with patents was made possible. Finally, the re-use and free exchange of farm-saved seed can now be prohibited at national level; alternatively, royalties are imposed on these age-old practices. Further restrictions are expected.[26]

The TRIPS Agreement of 1994 commits all WTO members to introduce national patent systems and created an international basis for introducing the patentability of living matter (Art. 27.1, Art. 27.3(b)). Though governments do not *have* to introduce patents on plants, animals and essentially biological breeding processes, they can certainly do so now. And they are required to introduce an 'effective sui generis system' for plant *varieties*. Since this is mostly interpreted to mean UPOV-91, the PVP regime has been boosted indirectly as well. A review of the relevant TRIPS provisions (Art. 27.3(b)) has failed so far due to the massive political conflicts surrounding the issue. Even more far-reaching than TRIPS are so-called bilateral or regional TRIPS+ Agreements which the US and EU conclude with many developing countries.[27]

Finally, a treaty is currently being negotiated under the auspices of the World Intellectual Property Organisation (WIPO) which might go far beyond TRIPS, too: the Substantive Patent Law Treaty (SPLT) shall not only set minimum standards like TRIPS but define substantively harmonised patent standards at the high levels of the US, EU and Japan. The extent to which exceptions to patentability – which TRIPs still allows for – will then be possible and whether governments can define patentability criteria additional to those to be defined in the SPLT are doubtful. After the politically fraught WIPO process had almost grinded to a halt in 2006, negotiations are being taken up again in mid-2008. These developments are a challenge for agrobiodiversity policy because, depending on the nature of the concrete IPRs, private monopoly rights impede breeders' access to breeding material and farmers' use of seed and conventional farming practices.[28] Also, IPRs increase the costs of seed, impacting on the livelihood of farmers as well as encouraging concentration processes in industry, which in turn will reduce the diversity of seed supply. Not least, the taking out of patents through publicly funded development institutions (e.g. the CGIAR) and cases of biopiracy, i.e. the uncompensated and undisclosed use of genetic materials, put a strain on North-South relations.

On the topic of *agricultural production trends*, we would like to briefly discuss biofuels, genetic engineering and the globalisation of industrial agriculture. We have to some extent already pointed to these developments and their problematic nature in the above sections. An emerging trend is the large-scale cultivation of biomass for energetic use, i.e. power, heat and (bio-/agro-) fuels. With regard to the latter, global production of (sugar-based) ethanol increased from 17,315 million litres in 2000 to 44,875 million litres in 2005, and global production of (fat-based) biodiesel in the same period even increased from 893 to 3,762 million litres.[29] While these quantities represented roughly 1% of the total 2005 road transport fuel consumption, 11% of the total demand for liquid fuels in the transport sector has been judged technically possible by 2050.[30]

Leaving aside all other potential environmental (and social) impacts, these trends are likely to affect agro-

26 GRAIN (2007): The end of farm-saved seed? Industry's wish list for the next revision of UPOV. GRAIN briefing, February 2007.

27 Correa, Carlos (2004): Bilateral Investment Agreements: Agents of new global standards for the protection of intellectual property rights? http://www.grain.org/briefings/?id=186.

28 There is also a debate on whether UPOV's criteria for variety protection – the so called 'DUS requirements' on Distinctness, Uniformity/Homogeneity and Stability of new plant varieties – discourage plant variability.

29 Data compiled by Earth Policy Institute from F.O. Licht data, available at http://www.earth-policy.org/Updates/2006/Update55_data.htm

30 Doornbosch, Richard/ Steenblik, Ronald (2007), Biofuels: Is the cure worse than the disease? OECD Document SG/SD/RT (2007)3, Paris, p. 4.

biodiversity in at least three ways: firstly, as regards energy crop cultivation, the CBD's scientific advisory body predicts that monocultures may be preferred over crop rotations, resulting in the 'simplification of agro-ecosystems associated with a decrease in crop and farm biodiversity'.[31] Secondly, energy biomass plantations[32] may compete to a significant extent with agricultural land uses for food production.[33] They will hence leave less arable acreage to be used for a – probably shrinking – number and diversity of (indigenous) food crops, their varieties and farm animal breeds. Thirdly, current research and development efforts on cellulose-based ethanol (i.e. the more efficient 'second-generation' biofuels) explore the potential of genetically modified (GM) energy crops. While these fuels are presently still in the demonstration phase, the widespread use of genetically engineered energy crops could not only result in crosspollination of wild plants,[34] but also of agricultural crops, landraces and crop wild relatives.[35] Here we already touch on the second trend to be discussed: the role of agricultural biotechnology and increasing cultivation of GM food crops.

We will focus on their potential impact on *agro*biodiversity only. Note that introgression of transgenes is more likely with some crops (e.g. rapeseed, maize or sugarcane) than with others (wheat, barley, potatoes).[36] Transgenic introgression may not only harm organic agriculture, but also change the genepool and hence the environmental adaptability of crops that is potentially interesting for breeding purposes in the future. This is especially severe in the case of wild crop relatives and of landraces[37] in so-called 'centres of diversity'.[38] The latter are geographical areas in which crop species first developed their distinctive properties and exist in abundant diversity (e.g. Mesoamerica for maize). Both landraces and crop wild relatives are genetically much more diverse than cultivated varieties and contain genes for traits such as drought tolerance or pest resistance, which are valuable for improving the performance of existing varieties. Gene transfer *between* GM crops ('gene stacking') may produce new transgenic plants with an unknown impact on the environment and growing outside the safety regulations of controlled laboratory conditions. Finally, indirect effects of GM crop cultivation include a strengthening of monocultures, high-tech-farming and the required use of expensive chemical herbicides and insecticides. These are typically produced by the same few biotech multinationals that hold the rights to the large majority of patented GM crop seed. Local control over farming practices and indeed over the production and exchange of farm-saved seed are made impossible through IPRs and in future possibly through transgenic 'biological protection systems' such as GURTs (see Section 2.1).

In summary, GMOs threaten agrobidiversity in terms of both biology and social changes in farming practices. Finally, a mega-trend that also affects the two above trends is the globalisation of industrial agricultural production. It includes, among other things, the 'export' of the industrial production paradigm to developing countries (the first and second 'green revolution') through development agencies and international agricultural markets; international convergence of consumption patterns (e.g. of meat and dairy products); the increase of corporate control over a globalising food chain and the respective spread of practices like contract farming; and expansion into emerging markets of multinational supermarket chains with internationally homogenous products and sourcing requirements. Globalised agricultural production results not only in massive environmental degradation which again impacts on agricultural productivity.[39] It also promotes homogenisation and the diffusion of agricultural and food industry practices which destroy both agrobiodiversity and the livelihoods of its stewards: small-scale farmers, subsistence peasants, pastoralists, etc.

Let us finally turn to *environmental challenges* for agrobiodiversity policy. Climate change above all heightens the pressure to act quickly for agricultural biodiversity. The rise in temperature, changes in precipitation patterns, higher incidents of extreme whether events and the increase of greenhouse gases in the atmosphere and a great variety of indirect effects jeopardize agrobiodiversity[40] and, in the same vein, agricultural productivity and global food security. For example, global warming is expected to result in large-scale species extinction and, supported by rising levels of UV radiation, to trigger the spread of crop and livestock pests and diseases. Globally, the effects of climate change on agriculture and agrobio-

31 CBD (2007), New and emerging issues relating to the conservation and sustainable use of biodiversity – biodiversity and liquid biofuel production. UNEP/CBD/SBSTTA/12/9, p. 10.

32 As well as the building of infrastructures for its production, transport and export.

33 See Footnote 33 infra, p. 9.

34 See Footnote 33 infra, p. 10.

35 Gepts, P./ Papa, R. (2003), Possible effects of (trans) gene flow from crops on the genetic diversity from landraces and wild relatives. Environmental Biosafety Research 2, pp. 89-103.

36 Eastham, K. /Sweet, J. (2002), Genetically modified organisms (GMOs): The significance of gene flow through pollen transfer. Environmental Issue Report No 28. European Environment Agency.

37 I.e. local "varieties" produced over time through selection by farmers, not through modern breeding methods.

38 Quist, D./ Chapela, I. (2001), Transgenic DNA introgressed into traditional maize landraces in Oaxaca, Mexico. Nature 414, pp. 541-543.

39 IAASTD (2008), Synthesis Report of the International Assessment of Agricultural Knowledge, Science and Technology for Development.

40 GTZ (2006): Agrobiodiversity and climate change – a complex relationship. Issue Papers: People, Food and Biodiversity. Eschborn. The following elaboration is based on this paper.

diversity will vary significantly. While agriculture in temperate regions might even profit, tropical regions are most at risk.[41] But even subtropical to Mediterranean granaries like the Fertile Crescent in the Middle East, the 'cradle of civilisation' and indeed of agriculture, are severely endangered.[42] Thousands of breeds, crop species and varieties will be displaced or yields lost once climate change makes it too hot, too cold, too dry or too wet for them.

This is also the case with wild relatives of crops. A recent study revealed that within the next 50 years as many as 61 percent of 51 wild peanut species analysed and 12 percent of 108 wild potato species analysed could become extinct as the result of climate change.[43] As was pointed out in the previous paragraph, loss of crop wild relatives will have repercussions on food production as it reduces the options to adapt cultivars – especially in the face of changing environmental conditions. However, at the same time that agriculture requires genetic diversity as a source of resilience in order to adapt to climate change, that very diversity is threatened by climate change.

It is an ironic twist that agricultural biodiversity may concurrently provide a key to mitigate climate change: by enabling the gene pool to develop alternatives to today's high-performing varieties and breeds which can only maintain their performance through high energy inputs – fertilizer, pesticides, the heating or cooling of sheds, maintenance of irrigation systems, mechanisation, etc. While modern agriculture at the moment is a large-scale producer of greenhouse gases, the use of locally adapted crops and breeds and their associated ecosystem functions – managed by farmers, pastoralists and other local food providers rather than by global agro/food-conglomerates – can contribute to reducing agriculture's carbon footprint.[44]

The lesson to be drawn from the challenges discussed above is that international policies aimed at sustaining agrobiodiversity need to be much broader and more holistic than mere conservation programmes. Such policies will, however, yield multiple positive effects way beyond the 'survival' of individual varieties, breeds, or genes.

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41 Fischer, G./ Shah, M./ Veldhuisen, H. v. (2002): Climate Change and Agricultural Vulnerability. International Institute for Applied Systems Analysis. Report prepared for the World Summit on Sustainable Development. Laxenburg. Austria.

42 A. Kitoh, A. Yatagai and P. Alpert (2008), First super-high-resolution modelling study that the ancient 'Fertile Crescent' will disappear in this century, Hydrological Research Letters; Ortiz, R. et al. (2008), Climate change: Can wheat beat the heat? Agriculture, Ecosystems and Environment, Vol. 126 (1-2), pp. 46-58.

43 Jarvis, A., Lane, A. and Hijmans, R. (2008), The effect of climate change on crop wild relatives. Agriculture, Ecosystems and Environment, Vol. 126 (1-2), pp. 13-23.

44 Witzke, Harald von/ Noleppa, Steffen (2007), Methan und Lachgas – die vergessenen Klimagase. Wie die Landwirtschaft ihren Beitrag zum Klimaschutz leisten kann. Studie im Auftrag des WWF, Frankfurt a.M.

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Editors in charge of the current issue:
Miriam Dross and Martin Führ

Editor in charge of the forthcoming issue:
Martin Führ (fuehr@sofia-darmstadt.de)

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Authors of this issue

Susette Biber-Klemm, Dr. iur., MAE; University of Basel, Program Sustainability Research, Basel, Switzerland, Susette.Biber-Klemm@unibas.ch

Monika Brinkmöller, German NGO Forum on Environment and Development, Bonn, Germany, m.brinkmoeller@forumue.de

Birgit Dette, Lawyer, former head of the Environmental Law and Governance Division of the Öko-Institut e.V., Darmstadt, Germany, birgitdette@freenet.de

Martin Führ, Professor of public law, legal theory and comparative law. Society for Institutional Analysis (sofia), University of Applied Sciences Darmstadt, Germany, fuehr@sofia-darmstadt.de

Jochen Gebauer, Dr., Office of the Federal Chancellor, Department for Reduction of Bureaucracy [Bundeskanzleramt, Geschäftsstelle Bürokratieabbau], Berlin, Germany, Jochen.Gebauer@bk.bund.de

Simone Hafner, qualified lawyer, research assistant of Prof. Th. Schomerus, and student of Master of Law programme for Environmental Law, Lüneburg, Germany, simonehafner@hotmail.com

Katja Kukatz, Öko-Institut e.V. – Institute for Applied Ecology, Journalist, Public Relations & Communication Department, Freiburg, Germany, k.kukatz@oeko.de, www.oeko.de

Volker Mauerhofer, Mag. rer. nat., Mag. iur., Dr. iur., MA (Ecological Economics) Leeds; Consultant and visiting lecturer in Nature and Landscape Conservation Law at the Biological Faculty of the University of Vienna, Austria, volker.mauerhofer@univie.ac.at Giessaufgasse, 28/5/34, 1050 Vienna, Austria

Hartmut Stahl, Dr., Öko-Institut e.V. – Institute for Applied Ecology, Research Division: Infrastructure & Enterprises, Darmstadt, Germany, h.stahl@oeko.de, www.oeko.de

Franziska Wolff, M.A., Öko-Institut – Institute for Applied Ecology, Research Division: Environmental Law & Governance, Berlin, Germany, f.wolff@oeko.de, www.oeko.de

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The institute's mission is to analyse and evaluate current and future environmental problems, to point out risks, and to develop and implement problem-solving strategies and measures. In doing so, the Öko-Institut follows the guiding principle of sustainable development.
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Contact
Freiburg Head Office:
P.O. Box 50 02 40
D-79028 Freiburg
Phone +49 (0)761-4 52 95-0
Fax +49 (0)761-4 52 95 88

Darmstadt Office:
Rheinstrasse 95
D-64295 Darmstadt
Phone +49 (0)6151-81 91-0
Fax +49 (0)6151-81 91 33

Berlin Office:
Novalisstrasse 10
D-10115 Berlin
Phone +49(0)30-280 486 80
Fax +49(0)30-280 486 88
www.oeko.de

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Contact
Prof. Dr. jur. Gerhard Roller
University of Applied Sciences
Berlinstrasse 109
D-55411 Bingen/Germany
Phone +49(0)6721-409-363
Fax +49(0)6721-409-110
roller@fh-bingen.de

www.fh-bingen.de

The Society for Institutional Analysis was established in 1998. It is located at the University of Applied Sciences in Darmstadt and the University of Göttingen, both Germany.
The sofia research group aims to support regulatory choice at every level of public legislative bodies (EC, national or regional). It also analyses and improves the strategy of public and private organizations.
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Contact
Darmstadt Office
Prof. Dr. Martin Führ – sofia
University of Applied Sciences
Haardtring 100
D-64295 Darmstadt/Germany
Phone +49(0)6151-16-8734/35/31
Fax +49(0)6151-16-8925
fuehr@sofia-darmstadt.de
www.h-da.de

Göttingen Office
Prof. Dr. Kilian Bizer – sofia
University of Göttingen
Platz der Göttinger Sieben 3
D-37073 Göttingen/Germany
Phone +49(0)551-39-4602
Fax +49(0)551-39-19558
bizer@sofia-darmstadt.de

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In many countries lawyers are working on aspects of environmental law, often as part of environmental initiatives and organisations or as legislators. However, they generally have limited contact with other lawyers abroad, in spite of the fact that such contact and communication is vital for the successful and effective implementation of environmental law.

Therefore, a group of lawyers from various countries decided to initiate the Environmental Law Network International (elni) in 1990 to promote international communication and cooperation worldwide. Since then, elni has grown to a network of about 350 individuals and organisations from all over the world.

Since 2005 elni is a registered non-profit association under German Law.

elni coordinates a number of different activities in order to facilitate the communication and connections of those interested in environmental law around the world.

Coordinating Bureau

The Coordinating Bureau was originally set up at and financed by Öko-Institut in Darmstadt, Germany, a non-governmental, non-profit research institute.

Three organisations currently share the organisational work of the network: Öko-Institut, IESAR at the University of Applied Sciences in Bingen and sofia, the Society for Institutional Analysis, located at the University of Darmstadt. The person of contact is Prof. Dr. Roller at IESAR, Bingen.

elni Review

The elni Review is a bi-annual, English language law review. It publishes articles on environmental law, focussing on European and international environmental law as well as recent developments in the EU Member States. It is published by Öko-Institut (the Institute for Applied Ecology), IESAR (the Institute for Environmental Studies and Applied Research, hosted by the University of Applied Sciences in Bingen) and sofia (the Society for Institutional Analysis, located at the University of Darmstadt). The Coordinating Bureau is currently hosted by the University of Bingen. elni encourages its members to submit articles to the Review in order to support and further the exchange and sharing of experiences with other members.

elni Conferences and Fora

elni conferences and fora are a core element of the network. They provide scientific input and the possibility for discussion on a relevant subject of environmental law and policy for international experts. The aim is to gather together scientists, policy makers and young researches, providing them with the opportunity to exchange views and information as well as to develop new perspectives.

The aim of the elni fora initiative is to bring together, on a convivial basis and in a seminar-sized group, environmental lawyers living or working in the Brussels area, who are interested in sharing and discussing views on specific topics related to environmental law and policies.

Publications series

- Access to justice in Environmental Matters and the Role of NGOs, de Sadeleer/Roller/Dross, Europa Law Publishing, 2005.
- Environmental Law Principles in Practice, Sheridan/Lavrysen (eds.), Bruylant, 2002.
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elni, c/o Institute for Environmental Studies and Applied Research
FH Bingen, Berliner Straße 109, 55411 Bingen/Germany

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