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Implementing the Convention on Biodiversity With Respect to Domestic Animal Diversity

By Ilse Köhler-Rollefson, League for Pastoral Peoples

Background

The FAO (FAO, 1999; FAO/UNEP, 1995) is alerting the global community to the alarming figures in respect to domestic animal diversity. It estimates that about one third of the world's recognized 5000 livestock and poultry breeds are endangered and that breeds become extinct at the rate of one per week. Nevertheless, the subject has received much less attention than plant genetic diversity and hardly any awareness appears to exist about the problem of animal genetic resource erosion among either donor agencies or among NGOs and groups at the grassroots level. Contrary to the situation with plant genetic resources, approaches for participatory conservation are lacking, although the majority of the threatened AnGR are vested with traditional pastoralist and farmer communities. Domestic animal diversity is an outcome of these very diverse ethnic and social groups managing domesticated animal populations in a wide variety of habitats and manipulating their genetic composition according to their own needs, cultural preferences, indigenous knowledge and ecological conditions.

The reasons why indigenous breeds become extinct are manifold. Factors include replacement or cross-breeding with exotic breeds, alienation of common property resources (due to break-down of traditional management institutions, crop cultivation, irrigation projects, wildlife protection, tourism, etc.), political conflicts (land disputes and wars), natural disasters (droughts, floods, cyclones), technological advances (replacement of work animals by machines), integration into the global economy, unfavourable marketing and policy environments for local livestock products, and others.

Article 8 of the UN Convention on Biological Diversity states that genetic resources should be conserved in the "surroundings where they have developed their distinct properties" - which with respect to livestock is a reference to the farming and pastoral communities that have nurtured local breeds. Furthermore, the CBD spells out that "the knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity are respected, preserved and maintained". Clearly, the spirit of the CBD calls for a participatory approach to animal genetic resource conservation.

Formal Research on Animal Genetic Resources and the CBD

Let us now look at the activities and approaches of the two international institutions that have shouldered responsibility for finding solutions to the problem of animal genetic resource erosion, in the light of the provisions made in the CBD.

FAO

The Food and Agriculture Organization has been given a world mandate to study, advise, and set guidelines on conserving livestock genetic resources for present and future food security. A core activity of FAO's Initiative for Domestic Animal Diversity (DAD) is the establishment of a database to inventory and monitor AnGR resources worldwide — the DAD Information System or DAD-IS (http://www.fao.org/dad-is). Designated national coordinators in FAO member countries provide the information that is entered into DAD-IS. They characterize breeds according to their production characteristics and population size. The former include milk yield, lactation length, milk fat, litter size, birth weight, adult weight, and adult wither height. Population data recorded in DAD-IS include total population size, total number of females bred, total number of males used for breeding, etc. Up to date more than 5000 livestock and poultry breeds have been registered in DAD-IS. Currently, documentation is further being refined with individual countries compiling national status reports.

Going beyond documentation, the FAO Initiative is also involved in capacity building for achieving conservation of those breeds classified in the database as endangered and critical. Another task is to promote sharing of precious genetic resources as well as free access to this global "public good". To achieve this, the Initiative has set up an intergovernmental mechanism, a technical programme of management support for countries, a cadre of experts, and a country-based global infrastructure of national coordinators. Accepting that it will neither be possible nor even desirable to save the large number of recognized breeds, the FAO has invested heavily into a project of establishing genetic distances between the breeds of various species. The aim is to identify those breeds that are taxonomically most distinct and should therefore be prioritised for conservation (Barker, 1999).

The FAO has commissioned an expertise on the implications of the CBD for the management of animal genetic resources and the conservation of domestic animal diversity (Strauss, 1994). It makes the point that "the indigenous knowledge that has helped to produce and maintain domestic animal diversity is largely unexplored and yet this knowledge is essential in order to understand and continue developing these animal genetic resources." (FAO n.d.).

ILRI

Activities at the International Livestock Research Institute in Addis Ababa also focus on genetics at the molecular level such as establishment of a phylogenetic tree for cattle breeds of Africa and Asia and mapping of genetic traits. Again, these efforts are undertaken with an eye on identifying those genetic resources that are most worthy of being saved. ILRI makes no reference to the CBD (mention of which is also notably absent in the New Vision and Strategy of the CGIAR 2000). In its breed survey questionnaire it however asks for certain information on "adaptive and unique attributes" to be supplied from the Indigenous Knowledge of Farmers.

Omission of indigenous knowledge

The data collection strategies and databases of both institutions are geared towards the needs of scientists and representatives of government institutions. Rooted in formal scientific concepts and values, they are not designed to integrate and make use of indigenous knowledge. This results in an incomplete picture of the actual situa-

tion on the ground that could interfere with conservation efforts.

- Stock raisers and scientists use different terminologies and categories when referring to local livestock breeds. Farmers' breed classification systems may be more refined than the latter, indicating the existence of breeds that have escaped scientific attention. For instance, scientists opine that India's donkey population has not diversified into breeds, but local donkey experts distinguish at least three, phenotypically quite distinct types of donkey that hail from three different areas — making them, in all probability, three breeds or at least strains. Similarly, pastoralists had long known a camel breed from India with high milk-production potential before it was reported scientifically for the first time (Köhler-Rollefson and Rathore 1995).

- Stock raisers evaluate breeds differently than scientists. Whereas the latter are chiefly interested in documenting the output per single production cycle (under optimal husbandry conditions), feed and system efficiency is of greater relevance to farmers who raise animals under severe environmental constraints and have to cope with seasonal shortcomings in fodder supply. In addition, many breeds are appreciated for characteristics that have little to do with productivity, such as ritual significance, social role and aesthetic aspects.

- Population data that are based on scientific breed concepts and do not draw on local breed definitions and terminologies can be misleading. This is illustrated by the case of the Tharparkar cattle in India where no agreement obtains among scientists about which animals are to be subsumed under this category. Some scientists count the entire cattle population (several tens of thousands of head) in the two districts of India where it occurs (or once occurred), while others consider only the couple of hundred animals kept on state breeding farms as "true Tharparkar". Local people on the other hand do not know what 'Tharparkar' means and instead refer to it as 'Sindhan' (Köhler-Rollefson 2000).

As the FAO acknowledges, the sustainable management of AnGR is only feasible with the active participation of farmers and pastoralists. "The most rational and sustainable way to conserve animal genetic resources is to ensure that locally adapted breeds remain a functional part of production systems" (FAO, 1999). Adoption of local categories and understanding of local institutions for managing AnGR resources would be a prerequisite for the development of such participatory approaches.

ILRI has made the following public goods available according to information presented at its website (http://www.cgiar.org/ilri/products)

- A database on the distribution and physical performance characteristics of African cattle, sheep and goats
- A phylogenetic tree for cattle breeds of Africa and Asia
- Methods for determining ruminant breeds at risk of extinction
- A reference herd of N'Dama-Boran crossbred cattle serving as an international resource for a global project to develop a primary genetic map of cattle
- The first mapping of quantitative trait loci controlling resistance to haemoparasitic disease of major economic importance (animal trypanosomiasis)
- A set of genetic markers disclosing superior disease (trypanosomiasis)-resistant animals for use in livestock breeding programmes.

Furthermore, omission of indigenous knowledge and perspectives results in an evaluation of animal breeds on the basis of their outputs of cash products only. It is exactly the conception of animals as commodity producing machines while ignoring other vital traits that has been a prime mover in genetic resource erosion. On the other hand, domestic animal diversity in the South has evolved precisely because its people and cultures relate to animals in a different manner and accord them variable social status and ceremonial roles.

Hence reducing animals to gene sequences is neither legitimate nor will it serve the purpose of conserving domestic animal diversity. We must bear in mind that it was farmers and pastoralists who have created domestic animal diversity by subjecting animal populations to diverse cultural and ecological regimes. Scientifically designed manipulations of gene pools such as artificial insemination, embryo-transplantation, and now cloning on the other hand have invariably resulted in genetic homogenisation. (That this can have positive effects is not disputed here, but represents an entirely different matter).

Setting priorities for breed conservation via molecular genetic techniques is a scientific shortcut that ignores the human dimensions of domestic animal resources. It would seem much more urgent and appropriate to establish a dialogue with the ethnic groups and communities that are associated or have co-evolved with the respective breeds[1]. Understanding of their needs, priorities and attitudes should form the basis for developing conservation strategies. Science alone cannot be expected to conserve DAD, nor will in-situ conservation on government farms and standardized husbandry conditions suffice. Instead, we need to foster as large a diversity of approaches to conservation as possible by getting rural development NGOs, pastoralist associations and others into the picture!

Value of Local Breeds

One important factor driving the process of animal genetic resource erosion is lack of confidence in the value of local breeds. For decades, southern livestock breeds were a priori regarded as less productive than their northern counterparts. Furthermore, it was believed that genetic improvement by selection within the breed was too time-consuming to be worthwhile; hence all energies were spent on attempting a quick fix by crossbreeding. There is now increasing evidence that local breeds may not only be superior, but also that their productivity can be further improved within reasonable timeframes. One example concerns the various zebu cattle breeds (including Ongole, Gir, Kankrej) that were exported from India to Brazil, Australia and other countries earlier this century. In their new homes they have been improved on genetically and come to represent prime beef or dual purpose producers, whereas the Indian populations have decreased in number, become diluted due to cross-breeding and in some cases are regarded as threatened. Some private initiatives in India, such as that by the Gir cattle-breeding farm of the Shri Bhuvaneshwari Pith in Gujarat, show that considerable improvements in milk production can also be achieved. Examples where efforts to replace local breeds with imported ones were reversed include

[1] *Not all breeds are associated with particular communities; many of them are composite breeds - the results of scientific efforts to create new breeds, but local farmers never adopted that. It is questionable to what extent they need to be conserved.*

- The Indo-Swiss goat project in Rajasthan initially tried to popularise crossbreeding of local goats with Swiss breeds but then came to the conclusion that the native Sirohi goat was superior in many ways (Kropf et al., 1992).
- In Mexico, the Criollo pig was almost replaced by imported white pigs despite its usefulness for smallholders, its ability to make use of local feed and its better taste (Anderson et al., 1999).
- From South Africa there is the case of the Nguni cattle, which is disease resistant and can thrive on poor pastures. The government upgraded this breed by cross-breeding with European breeds but the improved animals also required much higher inputs, which became unaffordable to small farmers. Now there are efforts to re-supply farmers with Nguni cattle whose population has decreased (Blench, 1999).

Stock Raisers Rights

So far there have been no efforts to give credit to stock raisers for their role in nurturing domestic animal diversity, in tune with the concept of "Farmers Rights". This may in part be due to the fact that the significance of indigenous knowledge and institutions in breed formation processes has not yet filtered into general awareness. Animal scientists subscribe to the opinion that local livestock breeds have evolved only in response to ecological conditions without any intellectual inputs by pastoralists or farmers. Documentation of indigenous institutions and practices of animal genetic resource management is hence of crucial importance.

Unfortunately this has not yet happened, although the NGO initiative in India to establish People's Biodiversity Registers provides some valuable pointers. Its intention is to protect people's rights to their intellectual property and natural resources by building an open and transparent system on biodiversity resources from village level upwards (Utkarsh, 2000). It is urgent to extend a similar approach to pastoralists and farmers knowledge on domestic animal resources as well, since it is quite likely that the indigenous breeds from the South that currently receive little appreciation may at some stage in the not so distant future be in great demand in the North as well.

Northern high performance livestock is dangerously inbred and has lost many of its fitness traits. For instance, modern chicken strains are no longer able to hatch their young, because brooding behaviour is no longer present. Turkeys and certain pig breeds often can not mate naturally because of heavily developed chest and thigh muscles respectively and depend on artificial insemination for their reproduction. German cows only survive for an average of 2.7 lactation cycles. Farmers who want to raise poultry under natural conditions outside factory farming systems face problems of finding chicken that can survive outside cages.

To ensure at least a modicum of fitness and vitality in future populations of food-producing animals, and to keep genetic options open, access to fresh genetic material will therefore always be required. Since most of the wild relatives of today's domesticated animals are extinct, a major source of such material lies with the livestock raised by herders and farmers under extensive, subsistence-oriented production systems in the South. This is already being utilized for such purposes by northern livestock industries. In 1990 Australia imported embryos of 269 Tuli and 264 Boran cattle from

Zimbabwe and Zambia to improve its Friesian stock in regards to fertility, docility and environmental stress resistance. These imports were hailed as saviours of the northern Australian cattle industry (RAFI/UNDP, n.d.). The threatened N'dama cattle were used to create a new hardy, disease resistant breed called Senapol that is now raised in the southern US.

The danger of big corporations' free-for-all bio-prospecting among indigenous genetic resources is definitely real. As a recent paper on swine genetics recounts, "Some genotypes formerly not among the ones of economic interest for the industry became targets of the breeding companies' research programs which aimed at discovering and transferring specific genes from these genotypes to the industrial genetic lines. This is for example the case with the highly prolific Chinese breeds and the Iberian pig with excellent meat quality for production of extensively cured pork products" (Pereira et al. 1998).

Given that the stock breeding industry zealously guards and patents their own genetic materials, there is a moral imperative to extend similar protections to traditional stock raisers and breeders — although, granted, this will be no easy task.

Conclusions

Currently few benefits seem to percolate down to pastoral and farming communities from AnGR related activities currently pursued by formal sector international and national institutions. Agendas are pursued predominantly from the so-called "genetic resource angle" that seeks to save or rescue breeds in their role as carriers of genetic material that might have some economic potential in the future and could be valuable for humanity at large. While the important role of many indigenous breeds in sustaining rural livelihoods is also highlighted by the FAO, the existing strategies are insufficient for supporting and facilitating sustainable management of AnGR by farmers and pastoralists. We must be aware that extinction of a breed is often the outward symptom of an existential crisis experienced by the people who previously depended on it. Many breeds can best be saved by supporting the associated communities in their livelihoods through appropriate policies, such as those that ensure access to pastures and markets.

In order to conserve domestic animal diversity in the South in line with the stipulations of the Convention on Biodiversity, activities must be expanded to include the following strategies:

- Documentation of the local/indigenous institutions, breeding practices, and cultures of the peoples who nurtured and shaped so many hardy livestock breeds.
- Decentralization of activities to involve stock raisers themselves in on-the-ground conservation. Pastoralists with their long history of co-evolution often have a culturally highly developed sense of guardianship, partnership, or even personhood vis-à-vis their animals. This heritage should make them the lead actors in conservation efforts
- Ensuring that the specific ethnic groups and societies receive benefit from sharing the unique genetic resources they have created.
- Adoption of a more comprehensive sustainable livelihood approach towards con-

servation by instituting policies and programmes that secure access to pasture and animal health care and create a level playing field for the marketing of the products of local breeds.

- Information for pastoralists and breeders organizations about the rights they have been accorded in countries that are signatories to the CBD
- Capacity building of NGOs to take up roles as intermediary actors between governments/ research institutions on one hand and farmers/pastoralists on the other.

In summary, it is both technically and ethically imperative to open channels of communication with stock raisers and to institute mechanisms for reaching the grassroots groups — those who have shaped and stewarded different breeds down through the centuries and who stand to lose the most if these unique resources disappear from the fact of the earth. In order to successfully implement the Convention on Biodiversity, a close integration of the activities of all stakeholders - researchers, governments, civil society, but especially livestock keepers and pastoralists - is absolutely essential and steps towards this goal should be taken without further delay.

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Table 1: Numbers of breeds of the major livestock species recorded in the FAO Global databank for Animal Genetic Resources, and the numbers estimated to be at risk (source: R. M. Blench, 1999)

Species	Recorded	At risk	% at risk
Donkey	77	9	37.5
Buffalo	72	2	3.6
Cattle	787	135	23.2
Goat	351	44	16.5
Horse	384	120	43.3
Pig	353	69	26.0
Sheep	920	119	18.1
Yak	6	0	0
Dromedary	50	2	4.0
Bacteria camel	7	1	14.3
Alpaca	4	0	0
Llama	4	0	0
Guinea-pig	?	?	?
Duck	62	29	46.8
Turkey	31	11	35.5
Chicken	606	274	45.2
Muscovite duck	14	5	35.7
Goose	59	28	47.5
Guinea-fowl	22	4	18.2
Quail	24	16	66.7
Pigeon	19	4	21.1
Total	**3851**	**872**	**22.6**

Table 2: Livestock breeds at risk by region (source: R.M. Blench 1999)

Region	Recorded	At risk	At risk %
Africa	396	27	6.8
Asia Pacific	996	105	10.5
Europe	1688	638	37.8
Near East	220	29	13.2
South-Central America	378	15	4.0
North America	204	59	28.9
World	3882	873	22.5