Unforgivably, pastoralism continues to be listed as a main reason for desertification in UNCCD documents, although a large number of scientific studies refute this claim and emphasize the positive effects of this land-use strategy. The FAO also brought out a study last year on the effects of livestock on the environment in which it lumps together pastoralism with industrial livestock production. Drynet begs to differ and has collated some of the bright aspects of pastoralism in the paper below.

Looking at the Bright Side of Life Stock:
Mobile pastoralism and the environment

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FAO' s publication *Livestock's Long Shadow* provides an alarming account of the destructive impact of livestock on all aspects of the environment, be it land degradation, climate change, water depletion, air and water pollution, even biodiversity. While an in-depth discussion of the issue is welcome, it is unforgivable that the study lumps together indiscriminately all types of livestock keeping, ranging from landless industrial systems to pastoralism. Yes, industrial livestock production is extremely damaging and leaves a monumental carbon footprint, but other forms of animal husbandry can be highly beneficial to the environment, conserve biodiversity and even counter climate change. Livestock plays an indispensable role in upholding soil fertility and are a crucial means of recycling nutrients, as is well recognized in organic farming.

Here the focus is on pastoralism, a way of livestock keeping that bears no resemblance whatsoever to intensive production and is actually very much attuned to nature. Pastoralism is an ancient land-use strategy, almost as old as crop cultivation, that has shaped the landscapes and cultures of vast tracts of the world, including Northern and Central Asia, the Middle East, Western India, Northern Africa and the Sahelian zone, as well as the Andes in South America. It is defined differently in different parts of the world – for instance in Australia it comprises landed sheep producers - but in this context we understand it as the herding of animals on common property resources which either consist of natural vegetation or of fallow fields.

Value Addition of Uncultivable Land

One of the fundamental differences between industrial production and pastoralism is that the former depends on feed stuffs that have been produced elsewhere and frequently have been shipped around the globe. These feed stuffs currently include close to 50% of the world's cereal outputs, i.e. compete to some extent with cereals for direct human consumption! By contrast, pastoralism exploits locally available resources that would otherwise not be utilized. In fact, mobile pastoralism is the **only way** of utilizing for food and fibre production the large parts of the globe's terrestrial surface where crop cultivation is not feasible. This includes the approximately 20% of the earth's tropical and subtropical drylands which extend over 31,2 million square km, but also mountainous and high-altitude zones, as well as some very cold areas. In these eco-zones grazing with livestock provides a means of converting the local vegetation into food and energy that can sustain people. Without using herd animals as a medium, huge stretches of the word would have remained uninhabitable! Livestock is thus a means of putting in value uncultivable land and generating extra food without competing for cereals.

Land Degradation

If we look at the human-animal relationship, pastoralism is diametrically opposite to the kind of animal production taught at universities. In industrial schemes, the animal is inserted into an artificial environment as a means of production and its behaviour and reproductive parameters – fertility, age at first birth, reproduction interval - are manipulated to suit human convenience and the demands of profitability. By contrast, in pastoralist systems, people adapt their way of life to the behaviour and needs of their animals. Our research among pastoralists in India shows that it is not the people that initiate migration, but that the herds lead and people follow. Buffalo herders in the Himalayas, cattle breeders in Rajasthan, and camel keepers in the Thar Desert all emphasize that it is the animals that get restless and start moving towards greener pastures. In essence, pastoralism is a way of latching on to the migrations that animals would also undertake if they were still wild. It comes closest to farming in tune with nature, and allows to exploit resources and landscapes which could not be utilized by settled people.

Because, ideally, pastoralist animals keep on the move, the vegetation has opportunity to rest and recover. As long as mobility is maintained, there is not only no damage to vegetation, but it may even benefit from being grazed. In the case of some shrubs, being nibbled upon triggers them to develop a more extensive root system, thereby contributing to their drought proofing. In other cases, browsing induces trees to branch out more densely – resulting in a similar affect as pruning. Livestock also contributes to the physical breakup of soil, stamping seeds deep into soil where they can survive drought/winter, contribute to the mulching of dead vegetation, improve sunlight access to growing points, and support seed dispersal (www.holisticmanagement.org).

Land degradation itself is a tricky and contentious issue. How can it be measured and is there even a baseline against which it could be monitored? Range management science has developed the non-equilibrium model for drylands that is now generally accepted. It acknowledges that for areas in which average annual rainfall fluctuates by more than 30%, the carrying capacity is not fixed, but varies from year to year, depending on rainfall amounts and distribution (Scoones, 1994). The authors of *Livestock's Long Shadow* themselves admit that there are no reliable indicators for land degradation, that ecosystems fluctuate and that vegetation is remarkably resilient, but they still steadfastly reiterate that overgrazing is a serious, widespread and well-studied problem. Considering the controversial evidence and interpretations, it would have been better to omit this section (2.1.3).

Water

One particular beauty of pastoralism is also that, in general, it places practically no burden on groundwater supplies, contrary to irrigation agriculture by means of deep wells – a technique that has led to wide spread exhaustion of groundwater and of aquifers in many parts of the world, such as Western India and Pakistan. In fact, well broken up, mulched and vegetated soil, as created by intensive but periodic grazing, promotes water cycling and increases water penetration to the water table.

Desert adapted livestock species and breeds can go for significant periods without drinking, sometimes extracting all their water needs from the forage for months. Even in dry periods, their fluid needs can be fulfilled by means of surface water that is collected through indigenous techniques, such as toba or tanks in the Thar Desert. Now compare this with the water needs of industrial livestock production where it is estimated that the production of 1 kg of chicken meat requires 3500 litres of water, and the production of kg of beef the astronomical amount of 100,000 litres of water (Cornell University Science News, 1997).

Biodiversity

Plant biodiversity
There is basically a positive correlation between mobile pastoralism and plant biodiversity, since the grasslands contain a huge variety of plant species. For instance, the alpine and sub-alpine grasslands managed by Tibetan pastoralists in Yunan (China) contain 243 species of Gramineae (grass), 867 species of medicinal plants, 1578 species of flowering plants and 4600 seed plants, according to a survey conducted in the 1980s (Diqing Prefecture Agriculture and Animal Husbandry Bureau, 1987). Pastoralists were aware of the fodder and other values of individual species (Yin Lun, Liu Ling and Zhao Zhiming, 2006).

Thus, by utilizing natural vegetation and, in some cases, harvested agricultural fields, pastoralists do not contribute to the replacement of native flora with crop monocultures. This is again in stark contrast to industrial livestock production whose demand for feed is a prime mover in the deforestation of the Amazon.
Furthermore, in Europe it is now also recognised that grazing by livestock has shaped many of our favourite cultural landscapes. In Germany, the introduction of stall-feeding has changed the look of forests which earlier were grazed by village livestock. In the absence of such use, certain shrubs, such as blackberries have proliferated and prevent the rejuvenation of the large forest trees. Reintroduction of grazing has become a well-established method for landscape management that is supported by the Federal Nature Conservation Agency. Examples include the use of goats for controlling blackberry growth, use of sheep for keeping vegetation open and maintaining nesting habitats for migratory birds, or use of controlled grazing by sheep, cattle, and donkeys to re-establish sand-dune vegetation (Redecker at al., 2002).

Animal biodiversity.
Pastoralism also has positive interlinkages with wild and domestic animal diversity. Pastoralists' livestock can benefit the conservation of wild animals, especially predators, as evidenced by several examples from India (Lewis, 2003; Köhler-Rollefson and Life-Network, 2007). In Rajasthan's Kumbalgarh Wildlife sanctuary, leopards and wolves prey almost exclusively on sheep and goats. In the Gir Sanctuary for the Asiatic Lion in Gujarat, lions also depend on pastoralist livestock for part of their diet and when pastoralists were evicted from the sanctuary, this resulted in an exodus of lions which followed their prey. In Rajasthan's Desert National Park, created especially to save the Great Indian Bustard, restriction on livestock decreased the dung and thereby the insect population on which the bird exists – remaining populations are associated with livestock (Changani, pers. comm.).

The role of pastoralism in conserving livestock genetic diversity may be even more significant. It has been noted that a disproportionately high percentage of livestock breeds originates in drylands (FAO, 2006). Furthermore, pastoralists' herds retain many of the genetic traits that were present in the wild ancestors of domestic animals, but have been selected against in high performance breeds and have disappeared from their genetic make-up. These include for instance disease and drought resistance, certain behavioural traits, and general hardiness. Pastoralism acts as a kind of reservoir for livestock genetic diversity that may become highly valuable in times of climate change (Köhler-Rollefson and LIFE-Network, 2007)

Climate Change

Grazing lands and sylvi-pastoral systems are recognised as important carbon sinks. Even if "overgrazing" occurs, its effects are far less dramatic than in the case of ploughing for irrigation agriculture. Furthermore, where mobility is maintained and livestock number kept adequately high to avoid over-resting of the land, soil carbon can be increased.

Since climate change is expected to result in increased unpredictability of rainfall and increased temperatures, cultivable areas may shrink and revert to pastoralism. Pastoralism might have an additional advantage in coping with such scenarios. Under current climate change conditions, many species will soon become extinct in their existing habitats. Mobile and transhumant pastoralism could play an important role in transporting plant species to new habitats and climate zones that will provide better conditions for their survival.

Conclusions

There is no intent here to romanticize pastoralism. It is acknowledged that "traditional" pastoralism is dwindling in many parts of the world, especially rapidly developing countries such as India and China, although in some Ex-Soviet countries it is experiencing a revival. Many of the associated traditional knowledge systems are unravelling, and, because of the associated hardships, it is often chosen as a way of life by young people only for lack of other opportunities. Yet this should not close our eyes to the fact that pastoralism is an ecologically sound adaptation to harsh and unpredictable environments. It may also have a lesson or two in store for adapting to climate change. Secondly, pastoralism is the ecological foundation of a large numbers of cultures and a major and determining part of human heritage. Considering its environmental benefits, we should do our best to nurture and retain it as long as possible by creating supportive policy frameworks, by helping pastoralists to market their natural products at a premium, and by rewarding their role in the conservation of biodiversity and cultural landscapes.

Unfortunately, by failing to make a distinction between the different livestock production systems and by repeating scientifically outdated stereotypes about pastoralism causing land degradation and depleting biodiversity, the authors of *Livestock's Long Shadow* play into the hands of some of the arch antagonists of pastoralists: conservationists and conservation bureaucracies on one hand and governments with deeply ingrained prejudices against pastoralism on the other. This volume can be expected to be used by these parties as argument for eliminating livestock from protected areas and for sedentarizing pastoral nomads. We therefore hope that FAO would rectify these shortcomings in its future works, including revised editions of "Livestock's Long Shadow. This could contribute to a brighter future for pastoralists, for biodiversity conservation, and for better recognition and a more balanced assessment of an important part of human heritage.

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