

THE GLOBAL DRYLANDS IMPERATIVE

**INCREASING CAPABILITIES THROUGH
AN ECOSYSTEM APPROACH FOR THE DRYLANDS**
August 2003

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The purpose of the Challenge Paper Series is to challenge existing myths and current assumptions about dryland areas. It is written with the intention to change conventional perceptions of the drylands and to provide a reliable source of information for decision-makers.

The ***Global Drylands Imperative (GDI)*** was initiated as an informal group of international organizations, donors, NGOs and individuals interested in, or actively involved in, drylands development. Bringing dryland issues to the forefront of decision makers' dialogue is critical to poverty alleviation. Challenging current thought and generating creative solutions to dryland challenges will accelerate poverty alleviation. The GDI partnership is dedicated to addressing dryland issues by increasing the awareness of their importance among policy makers and within relevant international fora ~ especially targeting the United Nations Convention to Combat Desertification (UNCCD) Conference of the Parties (COP). The Challenge Paper Series, coordinated by the UNDP Drylands Development Centre in collaboration with the UNDP-GEF Unit, aims to reach decision makers by affecting important development discussions related to drylands. The UNDP Drylands Development Centre invites you to become an active member of the GDI (contact the UNDP Drylands Development Centre ~ ddc@undp.org).

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i. EXECUTIVE SUMMARY

More than one billion poor rural dwellers live in the world's drylands. Poverty levels are very high the average Human Development Index (HDI) in Sub-Sahara African countries that have large dryland areas is as low as 0.35.

Dryland ecosystems are heterogeneous in nature and have a rich diversity that includes forests, grasslands and wetlands. Dryland ecosystems are not in equilibrium, but are in continual transition—in climatic conditions, production systems, demography and social institutions. Dryland ecosystems are typically characterised by low and irregular rainfall, high temperatures, high rates of evapotranspiration, and cyclical drought. This strong variation in spatial and temporal conditions presents special challenges for the sustainable management of dryland ecosystems.

Dryland ecosystems offer four services—provisioning (food, fibre, minerals, water), regulating cum supporting (purification of water, nutrient cycling, hydrological regulation) and cultural (spiritual and social values). These services are intrinsically inter-dependent and are highly synergistic. People depend on all four ecosystem services for their well-being. However, the nature and degree of dependency will vary across groups. For example, some groups may have substitutes for some of these services, especially in the short run—a “non-poor” person can always purchase clean bottled water while the poor person depends on water from either the public water systems or directly from natural systems like springs and wells. Similarly, a commercial farmer can use fertilizers to maintain soil productivity and irrigation systems for watering the crops while a subsistence farmer will need to depend more heavily on the natural regulating and supporting functions of ecosystems with some help from fertilizers for the regeneration of soils and the supply of water (rain-fed irrigation).

The relationship between individuals or group of individuals with the various ecosystem services will be different across individuals, especially between men and women, and/or groups of individuals and these differences can create conflicts and cause some groups or individuals to become impoverished and destitute.

Human well-being and poverty is complex and multi-dimensional and as such, should be treated within a framework that recognizes and captures this complexity and multi-dimensionality. At the same time, the framework should provide policy makers and practitioners alike with a better understanding of the many ways in which human activities and well-being are closely related and affected by changes in dryland ecosystems and ecosystems services, and how these changes will in turn have an effect on well-being and poverty levels of individuals and/or groups of individuals living in drylands.

The capability-ecosystem framework used in this paper, moves beyond (but does not discard altogether) mere income and commodity measurements and considerations, and tries to capture the complexities and interactions between the individuals and dryland ecosystems on which they depend. The capability approach itself is concerned with the ability and freedom of individuals or groups of individuals to achieve the various things he or she values doing or being. The level of well-being achieved or poverty reduced by these individuals (both in the material and non-material sense) will be highly dependent not only on well functioning dryland ecosystems but also on the ability of these individuals to have access to these ecosystems and associated ecosystem services. For example, the ability to be adequately nourished—an important capability— could be drastically undermined if the provisioning service (soil productivity) of dryland ecosystems is reduced because of deterioration in the regulating and supporting services (soil enrichment and soil formation) and/or if access to this service is restricted or prevented.

The notion of having the ability to choose, and having the freedom to do so is critical, especially in dryland ecosystems, in terms of increasing well-being and reducing poverty. For example, the capability to be adequately nourished is increased if individuals have the choice of growing some of the food,

collecting others from the ecosystems directly and purchasing the rest from the commercial sector. Reducing these choices diminishes the capabilities and at the same time, increases the vulnerability of people, especially the poor living in drylands.

The freedom of making choices and increasing capabilities with respect to ecosystem services is closely linked to an inclusive, fair, equitable and transparent access to all dryland ecosystem services. In a majority of cases, inequitable distribution of access to dryland ecosystems and their services occurs when formal and/or informal institutions break down. There are many reasons for institutional failure. For example, powerful individuals or groups prevent the establishment of institutions and/or appropriate the organizations that mediate and regulate the distribution of dryland ecosystem services.

Creating, revising, and modifying institutions is a social process. This social process is greatly emphasized by the capability approach which puts forth certain preconditions that must be fulfilled as well as certain instruments to ensure that these preconditions are fulfilled. These are called “instrumental freedoms,” which are necessary in order to ensure that this process is equitable and fair. These freedoms play a critical role in preventing or mitigating institutional failure. This paper identifies six instrumental freedoms as necessary conditions which have direct bearings with policy making. They are: participative freedom; economic facilities; social opportunities; transparency guarantees; ecological security; and protective security.

These freedoms are not luxuries, and cannot be deferred until some level of macroeconomic growth has been achieved. We argue here that these freedoms are complementary, rather than substitutes. Social, political, economic, and ecological freedoms are essential if equity, fairness, justice, and choice are to be addressed. In order to take advantage of economic facilities, for instance, it is essential to have some social opportunities, such as health and education, available. In a similar fashion, it is necessary to have participative freedom and transparency guarantees if ecological security is to truly benefit local dryland communities.

The six instrumental freedoms provide the space that allows individuals in drylands to define their rights—legal, political, social, ecological—and to create institutions to protect and oversee a fair and equitable distribution of these rights for all members of society. In this manner, individuals, especially the poor and women, are given the ability to make their own choices for self-determination. This process allows them to become agents of change.

The well-being of present and future populations living in drylands will depend on ecologically sustainable and socially equitable ways of living. Drylands are resilient systems, but humans are not as resilient and are vulnerable, especially during times when dryland productivity drops. In order to reduce the vulnerability of the poor and make them more resilient to shocks such as droughts, they should be given a variety of choices when making decisions; in other words increase their capabilities. In order to achieve this we must:

- ❖ Move away from a “one size fits all” strategy or approach toward a more complex and adaptive dryland ecosystem management strategy that embraces, understands and respects the heterogeneity of drylands as well as its interaction with the variety of human beings that live in these ecosystems.
- ❖ Management strategies need to work within the dynamics of drylands and not go against the fluctuations and changes in these ecosystems. This means not to try to increase drylands productivity for example, achieved in other high yielding ecosystems, through the use of technologies that are not suitable for drylands ecosystems.
- ❖ Management strategies need to recognize that droughts are not abnormal events in drylands. Management strategies that reduce the vulnerability of people, especially the poor and take into account the reality of droughts are best suited for the drylands.

- ❖ Management strategies need to take into account the temporal dynamics underlying dryland ecosystems. Mobility of people and flexibility of tenure systems may be necessary to accommodate these regular seasonal changes.
- ❖ Management strategies must be designed that respect the different degrees, and types of use, of ecosystem services to ensure that no stakeholder groups are marginalized in the process. Recognizing that different stakeholders use ecosystem services in different ways and have different degrees of dependency on these services is critical. Some may have clear substitutes while others have more limited options.
- ❖ The focus must not only be on improving human well-being in terms of material wealth as this will only have limited success. Moreover, there can be a tendency for this to work for a minority who have access to the provisioning services provided by drylands but does not work for the majority who are excluded from these provisioning, regulating and supporting services. This majority suffers the most when dryland ecosystem services are depleted and when the productivity falls during times of ecological stress.
- ❖ These challenges are exacerbated by the diversity, variability and transition that characterize drylands. To help meet these challenges, an ecosystem management paradigm is emerging that considers how human use of an ecosystem can maintain both its functioning and productivity (White et al., 2002; Gunderson et al., 2002).
- ❖ Combined with the above described efforts, attempts should be made to ensure policy coherence among and between policies at all levels.

In determining how to achieve all the above, value judgments have to be made concerning equity and ecosystem stewardship in drylands. Such understanding and depth of knowledge will always be needed to inform and support responsible and far-sighted governance in dryland ecosystems.

Many poor people say that they want to be able to make choices, to decide to do basic things without constraint, to live in a predictable environment and have some control over what happens.

Voices of the Poor, World Bank, December 1999

1. CRITICAL ISSUES

The world's drylands conjure up an image of barren unproductive land perhaps not worthy of development investments but in fact, contain a surprisingly diverse range of thermal regimes, soil and vegetation conditions, and human populations (Box 1¹). This spatial diversity is matched by temporal variability—the unstable short-term climatic characteristics of drylands overlay long-term climatic transitions occurring over hundreds to thousands of years. As a result, dryland ecosystems have evolved to be sensitive to variable water supply but resilient to aridity. Plants and animals have evolved various adaptations to cope with these constraints and human populations have been an integral part of dryland ecosystems for thousands of years.

BOX 1: CHARACTERISTICS OF DRYLANDS	
CHALLENGING & RESILIENT ECOSYSTEMS	VULNERABLE POPULATIONS
<ul style="list-style-type: none"> • Low and irregular rainfall • High temperatures and evapotranspiration • Cyclical drought • Large extent (40% of world's land area)² • Range of aridity regimes³ <ul style="list-style-type: none"> ○ Semi arid , 45% of drylands area ○ Arid, 30% ○ Dry subhumid, 25% • Diversity in landcover⁴ <ul style="list-style-type: none"> ○ Shrubland, 24% area ○ Cropland, 20% ○ Savanna, 15% ○ Grassland, 13% area ○ Forest, 8% ○ Urban areas, 3% ○ Other, 17% 	<ul style="list-style-type: none"> • 2.3 billion people⁵ (38% of global population) • About 0.9 million city dwellers⁶ • More than one billion poor rural dwellers⁷ • 39% of sub-Saharan Africa population live in drylands⁸ <ul style="list-style-type: none"> ○ 70% of labour force in agricultural sector ○ Low Human Development Index (0.35) ○ Majority in extreme impoverishment ○ Face high risk of increased climatic variability and hotter and drier climate in many areas resulting in increased desertification

It is important to understand that dryland ecosystems should not be perceived as being in equilibrium, but in continual transition—in climatic conditions, production systems, demography and social institutions (Mortimore, 1998). One of the main transitions in drylands, like in many other areas, has been a substantial increase in land use change over the last few hundred years, driven particularly by settlement frontiers and economic development (Richards, 1990). As a result, and coupled with a number of other complex contributing factors (including rural neglect, migration, war, trade barriers, modern communication, failed development projects, etc.) dryland ecosystems and their human population are now under increased threat and the coping mechanisms of dryland households to buffer themselves against risk are breaking down.

We cannot escape from the fact that climatic constraints and often-sensitive soils of dryland ecosystems make them particularly vulnerable to degradation. For example, global estimates suggest that possibly as much as 70% of all drylands are now degraded to some extent (WCED 1987, Conacher and Sala 1998, Richards 1990, UNCCD, 2000). The FAO Terrastat database points out that twenty-one out of twenty-four countries in Sub-Saharan Africa have more than 30% of their land classified as drylands and these countries

¹ Most of the Data in Box 1 are derived from World Resources Institute data, cited in Dobie (2001) and White et al., 2002.

² UNEP (1997)

³ UNEP (1997)

⁴ White and Nackoney (2003)

⁵ UNDP (1997; 1999)

⁶ Calculated by Dobie (2001) based on WRI (1997)

⁷ Calculated by Dobie (2001) based on WRI (1997)

⁸ Figures calculated from FAO's Terrastat Database, UNDP's Human Development Report (2002), and Scherr (1999).

face a staggering 75% risk of desertification (<http://www.fao.org/ag/agl/agll/terrastat/wsr.asp>) But more importantly, the percentage of the population living at risk from desertification in these countries in most cases is about 90%. A majority of the countries have a high proportion of their labor force working in the agricultural sector with an average ratio of about 70%. Eighteen of these twenty-one countries have an average Human Development Index (HDI) of 0.35 (Human Development Report-UNDP 2002).

Apart from the natural vulnerability of drylands to degradation, their seemingly low production potential has made drylands less favored for the systematic investments in the land that are needed to offset the negative effects of human land use and sustain the productive capacity of dryland ecosystems. However, locally there are instances where population increases have resulted in increased investments in ecosystem conservation, although it is often difficult to reconcile local and global observations on the degree and extent of degradation (Mortimore, 1998). One of the major current challenges is to achieve sufficient understanding of the linkages between human actions, dryland ecosystem processes and human well-being, against this background of diversity, vulnerability and transition, for the sustainable management of drylands.

The critical issue is how to allocate resources to development in dryland areas in a way that is beneficial to the poor and at the same time can stimulate investments in ecosystem conservation. This challenge is made greater by the diversity, vulnerability and transition that characterize drylands. To help meet this challenge, the paper supports an ecosystem approach that considers how human use of an ecosystem can maintain both its functioning and productivity, which in turn feeds back to support human well-being. We begin by describing the main elements of ecosystem services and human well-being before going on to examine the links between them, including conflicts and trade-offs. We then propose intervention strategies to address these issues, and ways of improving policy coherence. Finally, we summarize by listing the main challenges for implementing an ecosystem approach.

2. DRYLANDS AND ECOSYSTEM SERVICES

Drylands offer a range of **provisioning, regulating, cultural and supporting** services that contribute to human well-being (Box 2)⁹.

BOX 2: EXAMPLES OF ECOSYSTEM SERVICES IN DRYLANDS

PROVISIONING SERVICES

Human food (plant and animal products, livestock fodder)
Fibre

Fuels (woodfuel, fossil fuels)
Timber

Pharmaceuticals (e.g. from plant products)
Minerals (metal ores, construction stone, gem stones)
Fresh water

REGULATING SERVICES

Purification of air and water

Hydrological regulation
Detoxification and decomposition of wastes

Crop pest control
Maintenance of biodiversity
Climate regulation

CULTURAL SERVICES

Aesthetic values
Spiritual and social values

SUPPORTING SERVICES

Primary production
Soil formation
Pollination of plants
Nutrient cycling
Provision of habitat

Provisioning services such as food, fiber and fuels (e.g. charcoal) have been the main driving force behind human use of drylands. Some food crops that are not well adapted to drier areas, such as maize, have been extensively grown, whereas the potential of some well-adapted food crops, such as indigenous tree fruits, have been greatly underutilized. Although products such as pharmaceuticals have received little economic attention, they are still the main source of medicines for rural dryland populations and their commercial economic potential is becoming increasingly recognized.

The sustainability of provisioning services depends on the maintenance of regulating and supporting services. **Regulating services** directly regulate the environment, whereas **supporting services** indirectly sustain the environment over long time scales. For example, crop production relies directly on the maintenance of the soil's ability to infiltrate and retain water. Often less considered is the importance of maintaining the functional capacity of key groups of soil microfauna and flora for decomposition of animal and other wastes, thereby reducing human health risks and releasing nutrients for uptake by plants. Soil

⁹Box 2 is modified from Duraiappah (2002) and is compatible with categories used by the Millennium Ecosystem Assessment.

formation is an example of a supporting service, which is necessary to regenerate soils over very long time scales. With increases in pressure on ecosystems, we have become more aware not only of the importance of regulating and supporting services but also of the importance of the cultural services they provide, such as aesthetic value. For this paper, we shall group regulating and supporting as one service due to the close overlap they have with each other.

Regulating/supporting and cultural services are difficult to quantify and value over large areas, and therefore their importance to human well-being is usually less understood and under-valued compared with **provisioning services**. This problem is probably more pronounced in dryland areas, because the ecosystems are much more complex, unstable, and generally less researched than, for example, tropical rain forests. Because low water supply slows biological processes, there are often long time lags between land management interventions and observed responses in dryland ecosystems, making it more difficult to establish cause and effect.

A fundamental problem for sustainable dryland management is that there are usually direct tradeoffs among provisioning services and regulating, cultural or supporting services. For example, upstream dams and drainage schemes implemented in the Tigris-Euphrates river system have increased provisioning services, such as fresh water and food production, but at the expense of the Mesopotamian marshlands, which have decreased in area by 90% during the past 25 years (UNEP, 2002). The degradation of the marshlands has led to loss of habitat for many species of migratory birds, mammals and fish, and the displacement of the indigenous people

It should also be recognized that there is a high degree of synergy among the different services, for example, as a result of strong inter-linkages among primary production and hydrological and nutrient cycles. Over-use of provisioning services, such as excessive biomass harvesting, can impair the productivity of the regulating and supporting services, such as water and nutrient cycling, which in turn negatively impact on the ability of the ecosystem to produce goods, such as biomass. This feature of interdependency among ecosystem services is normally not taken into account in management and policy decisions, especially at watershed and national scales. Moreover, the loss in regulating services, compared with the provisioning services provided, tends to be much greater when sensitive land is put under unsustainable cropping or grazing practices. Such areas include, catchment headwaters, shallow soils or steeply sloping land, and landscape sink areas such as wetlands and riverine buffer areas.

Maintaining ecological functioning in dryland ecosystems will depend heavily on matching appropriate land use to local conditions so that provisioning services are obtained with minimal loss in regulating and supporting functions. In fact, management systems evolved by dryland peoples have achieved this balance in the past by adapting to variability and exploiting diversity, thereby strengthening the resilience of both the ecosystem and the production system (Mortimore, 1998). However, when economic drivers such as privatization of land and other political constraints (e.g. change or enforcement of political boundaries that restrict traditional movement of pastoralists) prevent mobility and resultant flexibility, for pastoralists, then the resilience of ecosystems can break down (Gunderson et al., 2002).

We have already characterized drylands as being in continual transition, and thus they may have many stable states. Therefore, the implication of loss of ecosystem resilience is that ecosystems can undergo sudden shifts to less desirable states, triggered by a disturbance that the ecosystem would have previously absorbed. To avoid such undesirable changes in ecosystem state, there is need to design adaptive management systems that maintain ecosystem function despite unexpected disturbances (e.g. drought, El Nino events, fire, sudden changes in input or supply markets). For example, restriction of vegetation patchiness in semiarid rangelands can lead to increased water run-off and loss of ecosystem resilience to variation in rainfall. This can occur when a combination of high grazing intensity and increased drought stress reduces perennial grasses in favor of annual grasses, which are less effective in controlling erosion, resulting in lower soil quality and production potential. To change the system back to a productive state may require removal of livestock for many decades (Walker, 2002).

Most undesirable changes in state of ecosystems due to management result from a lack of understanding of the interactive effects of drivers of ecosystem dynamics as well as being unaware that there are threshold effects in these dynamics that result in changes that are irreversible, or at the very least difficult to reverse. For example, cultivation and over-grazing in sensitive drylands in Malawi have led to severe gully erosion over the past 30 years, which has lowered the water table, destroying the potential of grasslands for dry-season grazing (Young, 1998).

In conclusion, human over-exploitation of provisioning services of drylands has had negative impacts on their regulating, cultural and supporting services, which is feeding back, often in unexpected ways, to threaten the provisioning capacity of drylands upon which human welfare depends. Sustainable use of drylands will depend on understanding and managing the inter-linkages and trade-offs among the different ecosystem services and how they contribute to human well-being.

3. HUMAN WELL-BEING AND POVERTY

There have been many formulations and definitions of human well-being (see Alkire, 2002 for a comprehensive discussion). Most commentators would agree that human well-being is multi-dimensional and includes a necessary material minimum for a good life, the experience of freedom, personal security, good social relations, and the conditions for physical, social, psychological, and spiritual fulfilment (MA 2003). Within this list, a distinction needs to be made between the determinants of or means to well-being and its constituents—that is, as an end (Dasgupta 2001, Sen 1999).

Sen argues that although determinants of well-being—for example material wealth and income—are important, they should not become ends by themselves (see Box 3). He goes on to argue that what people value as a constitutive element of well-being is the ability to achieve doings and beings individuals' value—the freedom to choose (Sen 1992, 1999). An example would be the choice to fast versus starving. The end product is the same but, in the case of the former, the individual chooses to go hungry while in the latter, the individual has no choice. Sen calls these combinations of doings and beings from which people can choose to lead the kind of life they value **capabilities**. By adopting capabilities as the indicator of well-being, the emphasis is now, not only on what is actually achieved at the end but also the processes by which these ends are achieved. In this way, the agency dimension—the act of participating and doing it for oneself—of human well-being is also captured explicitly.

Box 3:

Income may be the most prominent means for a good life without deprivation, but it is not the only influence on the lives we can lead. If our paramount is in the lives that people can lead- the freedom they have to lead minimally decent lives-then it cannot but be a mistake to concentrate exclusively only on one or other of the means to such freedom. We must look at impoverished lives, and not just at depleted wallets...An impoverished life is one without the freedom to undertake important activities that a person has reason to choose.

Sen 1999

The *World Development Report 2000/01* defined poverty as “the pronounced deprivation of well-being” (World Bank 2001).

In this light, **poverty** can be defined as **capability deprivation**

By defining poverty as capability deprivation, we have embraced not only the multi-dimensional nature of poverty but also have shifted the attention away from a narrow focus on income and/or commodity deprivation to include choice and agency deprivation. Moreover, focusing on what people can do and be—people’s capabilities—and allowing for plurality of the various links individuals and/or groups of individuals have with ecosystem services is not at all antagonistic with the need to be sensitive to the environment. As Sen puts it “Since many human freedoms and components of the quality of life are dependent on the integrity of the environment, development cannot but be sensitive to the quality of the environment. He goes on to say that the opportunity to live the kind of lives that people value-and have reason to value—depends inter alia on the nature and robustness of the environment”.¹⁰

The notion of using capability and poverty as capability deprivation is not an abstract idea. It is been increasingly adopted by many of the multi-lateral development agencies working in poverty reduction. For example, the Development Assistance Committee (DAC) of the OECD used capabilities extensively in its guidelines for poverty reduction (OECD 2001) and the United Nations Environment Program (UNEP) in its poverty reduction and environment framework report (UNEP 2002).

4. LINKS BETWEEN ECOSYSTEM SERVICES AND HUMAN WELL-BEING

Many capabilities are intrinsically linked with ecosystems and ecosystem services (see Figure 1). However, as stressed earlier in the paper, the degree of dependency of these links varies across individuals and/or groups of individuals. For some, there will be a variety of options—in the short to medium term—to substitute but for others, especially the poor and the impoverished, the options are limited and their degree of dependency on well functioning ecosystems is high and critical for them if they are to achieve the capabilities they value doing and being, as follows below in bold.

Being able to be adequately nourished and its relation to Ecosystem Services

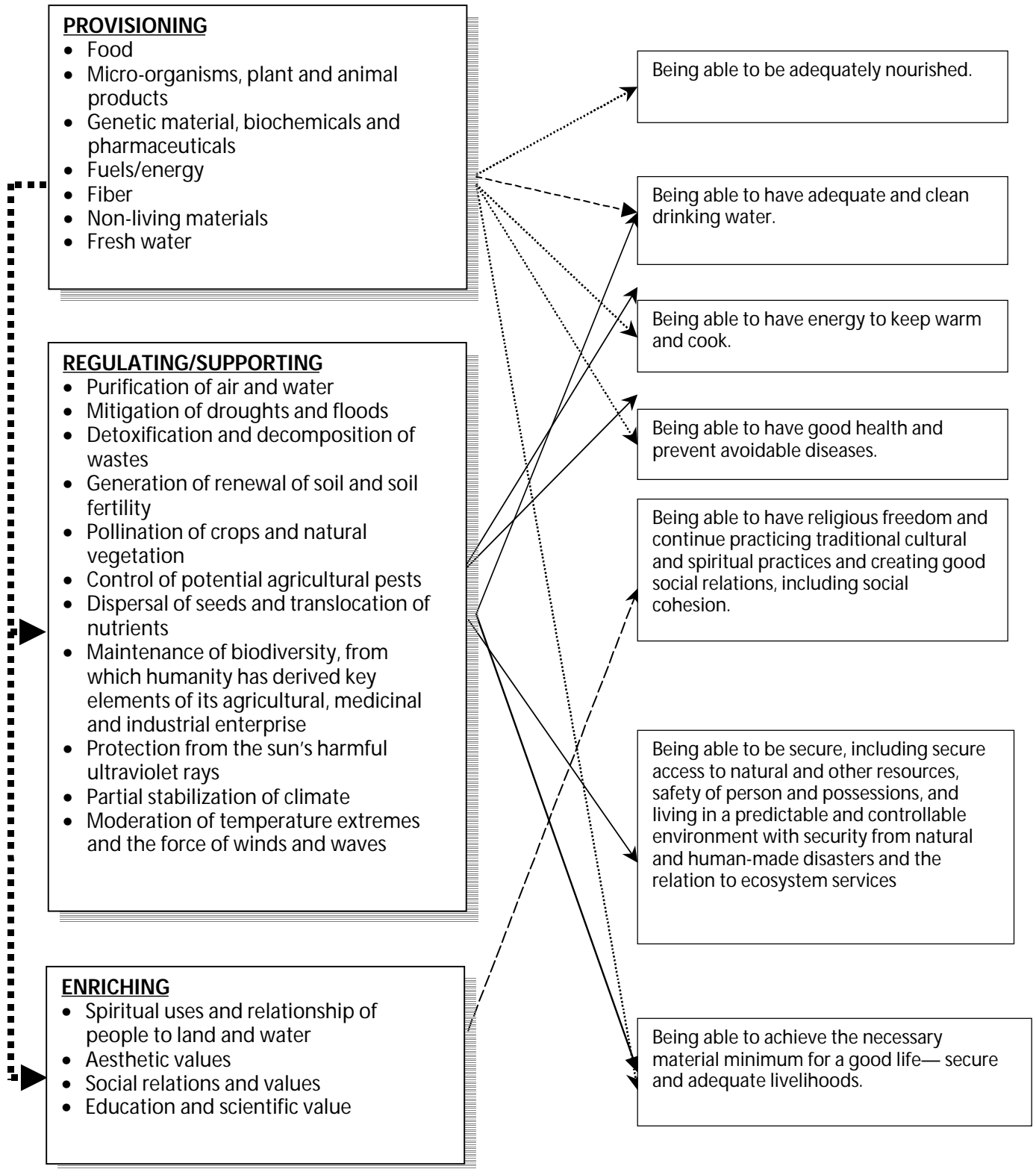
The ability of individuals living in drylands to be able to be adequately nourished depends on their ability to be able to:

- grow the food themselves; and/or;
- purchase the food; and/or;
- collect food from the natural ecosystem.

Many rural households in developing countries rely quite heavily on producing their own food (subsistence farming and pastoralism) and sourcing additional food products from the wild. In fact many societies rely on the biodiversity of wild foods to achieve a balanced diet (Gujit et al. 1995). Antzen documents the use of wild plants (morogo, berries, monkey orange) by local communities in the Sand veld of the Kalahari for food (Arntzen 1998)

¹⁰ India Development and Participation. Jean Dreze, A.Sen. 2002

FIGURE 1: LINKS AMONG CONSTITUENTS OF WELL-BEING AND ECOSYSTEM SERVICES IN DRYLANDS



Drylands offer many food products that have been staple diets of habitants living in these ecosystems. In fact, many of these food products are now being considered “health foods” in commercial food markets. Examples range from lentils, Faba beans (the poor person’s meat), and chick peas. However, clearing land for commercial production of agricultural crops reduces the source of these indigenous food crops. This has removed a staple and sustainable food source that has acted as a buffer during times of distress. Although the trend toward commercialization may have created a source of income and food, the main problem has been that the benefits have only accrued to a minority while the majority has been excluded from reaping the benefits of these new sources of economic opportunities.

Another impact of clearing land for commercial agricultural activities has been the removal of soil cover. Removing native vegetation leads to a rapid removal of soil cover inadvertently leading to soil erosion and a loss of the regulating function of nutrient recycling and protection against soil erosion and nutrient loss. Although some loss of soil is unavoidable, it is important to ensure that the trade-off between the benefits of the commercialization process and the costs of loss in some of the regulating services are weighed and analyzed before final decisions are adopted.

Being able to have adequate and clean drinking water and its relation to Ecosystem Services

Water is a critical resource in drylands and its scarcity makes it a valuable commodity. Drylands are usually perceived by many as very homogenous landscapes, but this is far from the truth. There are critical hotspots within drylands—wetlands, rivers, lakes, and water catchments—resources that habitants of drylands depend on for their water supply.

The ability to have adequate and clean water for drinking and other social needs like bathing depends on their ability to be able to:

- buy water in the private market;
- have access to water provided by the public sector;
- get water by themselves directly from surface water or groundwater systems;
- harvest rain water.

The viability of commercial agriculture and livestock in drylands is dependant on a secure and adequate water supply. This, in turn, sets up competition with the demands for social purposes. If stakeholders, especially the poor, have to purchase water in a private market, they may have to compete with commercial demands which may eventually lead to exclusion. Provisioning of water by the public sector in drylands is usually confined to urban centers. Even then, the availability of piped water for the poor who normally live in the slums is limited and, when available, the time spent waiting to collect water at public water points becomes long and tedious.

For the rural dwellers the picture is bleaker. The provision of water by the public sector is nearly absent and inhabitants have to either lay down tube wells to get ground water, get water from surface water, or harvest rain water. The appropriation and use of ground and surface water in many dryland areas in developing countries was traditionally determined through communal rules developed by the respective communities. However, liberalization of markets in developing countries has put pressure on many of the communal institutions overseeing the distribution of water rights. The commercial and small elite groups have been able to appropriate the rights to water which have in turn excluded the impoverished from these traditional supplies of water.

The privatization of water in the drylands is in many ways driven by the distinction between the equilibrium and non-equilibrium theories surrounding drylands. Proponents of the non-equilibrium suggest that private rights are not the best suited tenure arrangements but agree that in the hot spots that are characterized more by equilibrium conditions, private rights could be used. This has led to privatization of water supplies that are primarily in the equilibrium spots with little recognition that people living in the non-equilibrium areas also depend on the hot spots for their capabilities. This privatization has basically excluded them from these supplies of water, especially during times of stress. A typical example is the experience Maasai

pastoralists face now during droughts when they are excluded from the water resources in the uplands—their traditional water sources in the past—which have now all been all privatized (Amman and Duraiappah forthcoming).

Being able to have energy to keep warm and to cook and its relation to Ecosystem Services

The ability to have energy to keep warm and to cook depends on availability and access to:

- fuelwood;
- energy from the public sector like electricity from the grid or off-grid;
- alternative sources of fuel.

Biomass, especially firewood, is the main source of energy. There was for a while, a belief that fuelwood collection was the primary driving factor for excessive deforestation in drylands. New studies have shown that collecting firewood by the poor for cooking and, to a lesser extent, for warmth during winter months is not the main cause of deforestation. Instead, land-clearing for urbanization or commercial/economic activities like agriculture have been a bigger factor (Duraiappah 1998). The dwindling stock of fuelwood, and other traditional sources of energy, has left the poor with very few choices.

Efforts by governments to introduce new or alternative forms of fuel to meet energy needs have produced marginal results. One of the main reasons has been a lack of effective policies with the poor not being able to take advantage of the new fuels. Poor infrastructure in rural drylands also makes transportation of alternate fuels expensive and this expense makes buying fuel difficult and sometimes impossible for the poor. There have been recent trends in providing off-the grid electricity through alternative energy sources, for example, solar energy in drylands is a viable alternative. Now the challenge is to make solar energy more cost effective. It will also be important to look at the possible excess energy as an important income generator. If solar energy collectors in rural areas could transport stored energy to other areas with energy deficits this could be an excellent source of income.

Being able to have good health and its relation to Ecosystem Services

The ability to be healthy and prevent avoidable diseases depends on being able to:

- have access to the traditional medicines that drylands offer;
- have access to public health facilities;
- purchase medical services from private health facilities.

Dryland ecosystems produce a variety of plants that have medicinal properties. Many people living in drylands have been using these plants to maintain their health as well as to cure ailments and illnesses for centuries. The outright destruction and removal of these plants has resulted in rural populations losing access to this vital natural health system. No longer able to access natural sources of medicine, many of the poor in the drylands have been forced to turn to modern health facilities. With no other alternative, this may not have been too much of a problem if these health facilities were efficient and effective in providing the health care the poor needed. Unfortunately, in many instances, the facilities in the drylands are poorly managed and as the “Voices of the poor” study will attest, the poor feel disenfranchised when visiting these health facilities (World Bank 1999). Coupled with few choices, and with a health system they do not trust, the recent trend towards privatization of health facilities has put yet another barrier for the drylands poor to access, and to use, health facilities.

Being able to have religious freedom and continue practicing traditional cultural and spiritual practices and creating good social relations, including social cohesion.

There is really no substitute for religious and cultural values. In spite of the modern economic liberalization, sacred groves have and will continue to play an important role in the spiritual dimension of human well-

being. Sacred groves are one example – seeing a herd of cattle migrating through the landscape may have high esthetical maybe even spiritual value for a pastoralist. Religious festivals also provide an avenue for people to enjoy and forget about the hardships they face in their daily lives. They offer a place of solitude, a place to escape from reality and also a place where disputes and conflicts are resolved. Gods and idols that are believed to reside in sacred areas also play a very important role in people's lives. When migrants enter into a new area, they do not often have the same affiliation with these sacred areas and they may break traditional rules on usage of these areas. Through any means, destroying these areas destroys the symbols and the social fabric that holds these communities together—and when the social capital that binds communities together is broken, conflict is often a result.

Being able to gain the necessary material minimum for a good life— secure and adequate livelihoods.

There are a number of ways people can achieve the necessary material minimum for a good life in rural dryland areas. They can either:

- convert all resources into commercial agricultural activities;
- use their land for eco-tourism;
- carry out traditional livelihood activities like pastoralism and a combination of subsistence and cash crop agriculture;
- become paid labour;
- undertake a combination of paid labour and work on their 'own' land;
- find new markets for the regulating services drylands offer (e.g. carbon sequestration that can be used in CDM (Clean Development Mechanism) credits);
- engage in off-farm activities and Small Medium Enterprises (SME);
- use any combination of, or all of, the above strategies.

Livelihoods are sustained by the provisioning service ecosystems provide. In order to secure livelihoods, it is imperative that the flow of the provisioning service be maintained (see Box 4). This is, in turn, highly dependent on the regulating and supporting services ecosystems provide. The challenge for an ecosystem management regime is to decide the rate of harvesting and to ensure that individual rates of harvest do not have an impact on the regulating service that is necessary for social well-being. This becomes critical in an ecosystem like drylands. The ecosystem dynamics of drylands suggest that they are characterized more closely by non-equilibrium dynamics than the traditional equilibrium dynamics we see in other ecosystems and in the hot spots within drylands. In drylands, the focus needs to be redirected toward protective security issues relating to drought preparedness and mitigation, mobility of habitants, conflict resolution and ensuring equitable and fair access to scarce resources like water, grazing land and land in general.

An emerging market for the regulating service of carbon sequestering provides an option that people of the drylands may use as an income generating activity. The ownership and distribution of the credits from selling the carbon credits are issues that need to be carefully addressed. Effectively achieving carbon sequestering in the drylands would require a lot of land, it would be difficult to verify, and there would probably need to be some sort of contracts made with communities, but still the impacts may not be poor (see Petra Tschakert's work in Senegal). It is one option that needs to be discovered and discussed carefully with drylands people and not imposed upon them from the top. The social and ecological complexity of drylands needs to be taken into account when looking for new income generating options for the people living there.

BOX 4: LIVESTOCK MANAGEMENT IN THE KALAHARI, BOTSWANA

The ability to utilize Kalahari pastures on a permanent basis was provided by deep borehole technology which, by tapping fossil aquifers below the sand, overcame the 'age-old restriction' of a lack of surface water in the Kalahari. Boosted by the good rainfall years of the 1970's and an effective price subsidy on beef levied by the then European Commission, a borehole-dependent livestock sector advanced rapidly into the Kalahari sandveld over the last thirty years (Duraiappah and Perkins 1999).

The introduction of domestic livestock has caused substantial changes to the surrounding rangeland. The increase in woody biomass around the borehole that accompanies the introduction of livestock into semi-arid rangelands is well documented and is widely termed bush encroachment. Reducing the absolute amount of grass forage and forcing livestock to graze more distant pastures from the waterpoint is universally recognized as a serious problem for cattle farmers.

The effective privatization of tribal land by the allocation of borehole rights to individuals or syndicates, in former hunting and gathering areas, has completely changed the ecological and socio-economic context of land use in these areas. This has caused significant equity problems surrounding access rights to formerly communal resources.

Study results suggest that permits for boreholes must be controlled in order to prevent the reduction of bush encroachment. However, the equity issue surrounding the issuance of borehole permits needs closer scrutiny in order to prevent the de-facto privatization of communal land thereby preventing the mobility of livestock as well as the use of the other services provided by rangelands. These food products, fuel woods and medicines that are used by local communities are important constituents for human well-being (MA 2003).

Being able to be secure and having a sense of security, including secure access to natural and other resources, living in a predictable and controllable environment with security from natural and human-made disasters, safety of person and possessions and its relation to Ecosystem Services.

Security is a major constituent for human well-being. To be able to reduce vulnerability to extreme events like a drought is a capability people value. There are a number of ways to reduce the degree of vulnerability and improve personal resilience. The ability to have security of natural resources and to respond to, adapt to, and cope with extreme events depends on the ability of drylands populations to:

- maintain buffers in the ecosystem so that they can be used during times of distress. This involves a communal effort in order to reduce the cost of extreme event insurance;
- set aside critical inputs needed in order to allow the system to rebound after an extreme event. This will imply setting up security mechanisms like seed banks, food banks, and water banks;
- have access to and control over buffer grazing lands (for pastoralists) that have not been encroached on by other users. The other users would also need to be able to have access to suitable buffer lands for their sustaining activities, ensuring that this does not cause conflict among these strategies for coping.

The integrity of the regulating and support services provided by ecosystems must be kept intact, especially in the drylands. The use, and maintenance, of buffers is a strategy in the drylands that attempts to retain the integrity of regulating and support services, further emphasizing the importance of these ecosystem services to the livelihoods of dryland populations. The degree of regulating and support services available determines the rate of provisioning service apportioned to stakeholders. However, if this rate exceeds the regenerating rate of the ecosystem there will be a loss of function and resultant land degradation. The regulating and supporting services not only act as buffers during times of distress, but also determine the rate of regeneration of the ecosystem and the future rate of provisioning that the ecosystem can offer.

There is a close relationship between many of the constituents of well-being and the provisioning, regulating and enriching components of ecosystems and a high degree of interdependency and synergy among the constituents of well-being with each other (see Figure 1). For example, being adequately nourished undoubtedly contributes toward the capability of being healthy which in turn is needed for the capability to earn a livelihood.

We know that the provisioning service of ecosystems is highly influenced by the regulating/supporting services. Over-use, mis-use or excessive conversion of ecosystems into human or artificial systems damages regulating/supporting services which in turn reduces the flow of provisioning services that ecosystems can provide. We also know the close linkages that constituents of well-being or capabilities have with ecosystem services and that the nature of these relationships differs across individuals and/or groups of individuals. These three observations point toward a complex environment having a high probability of conflicts occurring between individuals and/or groups of individuals (see Box 5).

BOX 5: NATURAL RESOURCE MANAGEMENT, EQUITY, AND CONFLICTS IN THE NAROK DISTRICT OF KENYA
(Amman and Duraiappah forthcoming).

The Narok district of Kenya has been the scene for a series of continuing violent clashes caused by disputes over land tenure, land use and environmental degradation. The pastoralists living in the district were forced to keep their livestock within designated group ranches thus losing the mobility to move their herds to the highlands. The highlands, in the past, had provided a buffer—a form of security net—during times of drought. At the same time, intensive commercial wheat farming has increased the pressure on the pastoralists to compete for diminishing and deteriorating grazing land in the plains. The majority of these commercial farms operate under lease contracts offered by the management committee overlooking the group ranches. The temporary nature of these lease contracts creates a “mine and shift” attitude amongst the farms which, in turn, has caused excessive soil degradation. A lack of transparency in the management of the group ranches has also excluded many members of the group from access to land that they own and to the income generated by these lease contracts. The combination of losing access to the highlands buffer zone and the increasing loss of mobility within the grazing lands in the plains, has forced many of the pastoralists to experience deterioration in their well-being and in many cases has forced them into poverty.

Exclusionary practices—intentional or not—by the ‘non-poor’ prevent the poor from having access to services offered by ecosystems. For example, water rights are often granted to commercial operations drawing income into an area without measuring the affect of this extraction. The result is that the inhabitants of that same area have access to less water and the poor are deprived of this basic right. Clearly, some groups have not been able to take advantage of the new economic regimes of liberalization, privatization and globalization. Some of the main drivers enabling this inequality are:

- institutional¹¹ failure;
- lack of appropriate instruments;
- inefficient and corrupt government agencies;
- lack of information, participation and involvement by the poor in decision-making;
- lack of economic facilities;
- lack of social opportunities like safety nets;
- gender-based exclusion;
- lack of ecological security in terms of protection from adverse events;
- mistrust of bureaucracies and formal institutions due to lack of transparency concerning common property resources and the equitable transfer of rights during privatization.

By focusing directly on enhancing capabilities and reducing capability-deprivation, the process of analyzing the linkages between drylands ecosystems and poverty reduction can now be seen in an adequately broader way; looking at both “the constructive prospects as well as destructive possibilities”. Some examples

¹¹ Women and Human Development. M. Nussbaum. 2000

of the constructive dimensions include participation in decision making, transparency in access to ecosystem services and fairness in the use of ecosystem services. Similarly, examples of destructive possibilities range from exclusion of some groups by others in the access to ecosystem services and the inability of markets to address issues of fairness and justice in access to ecosystem services.

However, when it comes to make the case —most notably to experts from Ministries of Finance and Planning or to donor agencies— that investment in ecosystem services, and in this particular case dryland ecosystem services, is beneficial and has a positive impact on poverty reduction—the preferred element of persuasion is the short term income conversion of drylands provisioning services (Reij and Steeds, 2003). This is a view that needs to be contrasted with the multi-dimensional perspective of capability enhancement versus the one-dimensional perspective of income generation and/or the multi-dimensional commodity fetishism.

5. RESPONSE OR INTERVENTION STRATEGIES

Policy makers have been reluctant to invest much in dryland areas because they perceive that returns on investment are much higher in so called 'high' potential areas, and as a result the drylands have tended to become marginalized. In fact, the reverse is true, returns on investments can be greater in drylands than anywhere else, especially in terms of poverty reduction and maintenance of ecosystem services. A review of long-term studies in East Africa and the West African Sahel showed economic rates of return on investments in drylands ranging from 12 to 40%, with substantial impacts of up to 50% on rural poverty reduction (Hazell, 2001; Reij and Steeds, 2003).

There is a growing consensus for the need for policy intervention in the drylands to realize their potential (Mortimore, 1998). Investment must start with the premise that dryland households should be given primary responsibility for making decisions about the management of natural resources in drylands. From centuries of experience, dryland people know about managing risk and there is a need to extend, rather than replace, traditional strategies with 'modern' technological options.

A second major requirement is that individuals and communities are ensured secure rights to the benefits of conservation and improvement of dryland resources and that those investments are protected against unpredictable crises. Poverty reduction strategies for the drylands will depend on promoting broad-based agricultural development involving all sectors of the household economy. In particular there is a need to encourage improvement of land productivity through the development of efficient markets and improved access to national and international markets. This development will need to be supported by strengthening of public institutions that service natural resource management and rural areas, with emphasis on devolution of authority to local governments and integration at a local level.

We have highlighted the various choices individuals have with respect to achieving the capabilities they value and the links these capabilities have with ecosystems and ecosystem services. The objective of any policy intervention strategy must be to make these choices available to individuals while removing the 'unfreedoms' especially for the poor and the impoverished. Expanding the choice space prevents the poor from becoming dependent on any one particular option and reduces their vulnerability while improving the resiliency of their socio-economic-ecological system. In order to provide choices to the poor and allow them the freedom to achieve the capabilities they value, enabling conditions need to be created.

We draw on an extensive literature of freedoms (Sen 1999, 2002a, 2002b, Duraiappah 2002, Nussbaum 1999, Alkire 2002), and institutions (Ensminger 1997, Chopra and Duraiappah forthcoming, North 1990, Dasgupta 2001) to develop what we call the **instrumental freedom framework**. We propose that this framework be used to access and develop the enabling conditions required to provide choices that the poor need to get out of poverty and improve their well-being.

Institutions—formal and informal—mediate the link between ecosystem services and the constituents and determinants of human well-being. For example, institutions for community forest management in India have successfully facilitated access to forest products for local communities (Chopra and Dasgupta 2002). In most cases, ***inequitable distribution of, or access to, ecosystems and their services occurs when formal or informal institutions break down*** (Binswanger 1989, Jaganathan 1989, Duraiappah 1998). There are many reasons for institutional failure. Commonly, powerful individuals or groups prevent the establishment of institutions and/or confiscate the organizations that mediate the distribution of goods and services. Creating, revising, and modifying institutions is a social process. Certain preconditions or ‘instrumental freedoms’ are necessary to ensure that the process is equitable and fair. These freedoms, by permitting a fair and equitable social process, play a critical role in preventing or mitigating institutional failure.

Six freedoms that have been identified as necessary conditions are participative freedom, economic facilities, social opportunities, transparency guarantees, ecological security, and protective security (Sen 1999, Chopra and Duraiappah forthcoming). If a stakeholder is seen to have limited access to natural capital and is vulnerable to ecosystem services, then the ecological security instrumental freedom is limited. In order to increase their choices, an intervention strategy in the form of institutions, organizations, and instruments may need to be designed to ensure the stakeholder has a choice to use an ecosystem service with the aim of achieving the capability s/he has reason to value. In concert, the economic facilities that may be hindering choices (that enable one to achieve a livelihood capability) would also need to be addressed. For example, if markets are inaccessible then an intervention strategy to reduce the costs of reaching markets would also need to be considered. ***The important message in policy design is the need for an integrated approach.***

Contrary to the view that some freedoms are luxuries, and deferrable until some level of macroeconomic growth has been achieved, we argue that ***they are complementary rather than substitutes***. Social, political, economic, and ecological freedoms are essential if equity, fairness, justice, and choice are to be achieved. In order to take advantage of economic facilities, it is essential to have some social opportunities such as health and education (Drèze and Sen 2002). In a similar fashion, it is necessary to have participative freedom and transparency guarantees if ecological security is to truly benefit local communities (Duraiappah 2002). For example, one of the more common recommendations to improve natural resource management and increase income generation is the privatization of land in order to provide secure property rights to the owners. However, if not combined with ecological security which is critical in the drylands, then individuals will fare no better. If individual property rights are valued by individuals, then parallel initiatives that provide ecological security will also need to be designed.

The six instrumental freedoms creates the space that allows individuals to define their rights—legal, political, social, ecological—and to create institutions to protect and oversee a fair and equitable distribution of these rights for all members of society. In this manner, individuals, especially the poor, are given the ability to make their own choices for self-determination. This process allows them to become agents of change.

6. POLICY COHERENCE

The UNCCD has helped to formulate regional, sub-regional and National Action Plans for combating desertification (NAPs). The major challenges now are to: help countries to implement bottom-up action programs developed in the framework of instrumental freedoms that can be implemented at a local level; adapt existing land use policies to ensure the preservation or restoration of ecosystem function and services; enhance the capabilities of the poor; and mainstream these new policies into national development priorities (Ragnar et. al 1999).

Instruments and Institutional Coherence:

There are 13 global multi-lateral environmental agreements (MEA) and/or conventions and approximately 500 international treaties or other agreements related to the environment. Couple this with an equally large number of poverty reduction plans and development strategies and we get a complex policy arena with the potential for many conflicting objectives and goals at the institutional level. As the CCD covers development, it is imperative that the response options in the National Action Plans are synergistic with the other MEA related policies and contribute toward the national development and poverty reduction plans.

Organizational Coherence:

At the international level, each MEA has its own secretariat. At the national level, the responsibilities for the environment, poverty reduction and development strategies are spread across a number of different line ministries. It is important for the convention secretariats at the international level and ministries at the national level to work together toward common goals and objectives. An organizational matrix could be drafted to allow policymakers to see whom (organization) is responsible for what (institutions and instruments). This will provide some guidance in avoiding conflicts amongst the various organizations responsible for executing and implementing the strategies.

Vertical Coherence:

There is a need for vertical integration of the various policies, plans and/or strategies. International conventions must be coherent with national policies and these in turn must be coherent with local policies (Dobie 1999). Attempts must be made to develop a strategy that is vertically integrated at the instrument, institutional and organizational levels.

Horizontal Coherence:

Horizontal coherence refers to coherence at the international level, at the national level and the local level. This requires actors at the international level to work together and make an effort to ensure that their policies compliment each other (DAC 2001). The same is true for the national level. Ministries must work together to aim for a common goal. Their plans and strategies must be complimentary to each other and trade-offs among their plans must be highlighted, discussed and agreed upon before actions are implemented.

The overall objective for policy coherence should be to:

- improve the ability of Countries to meet their obligations;
- improve the ability of institutions at all levels to meet their goals in support of Country obligations.

A significant step toward meeting these goals can be made by making sure that policies are not fragmented, they are not duplicated, and that they do not result in unnecessary or additional transaction costs.

7. THE CHALLENGE

The well-being of present and future human populations in drylands depends on ecologically sustainable and socially equitable ways of living. Drylands are resilient systems. However, humans are not as resilient and are vulnerable, especially during times when dryland productivity drops. In order to reduce vulnerability and increase resiliency of the poor, they should be offered a variety of choices when making decisions and not just “a” way or one option. In order to achieve this we need to:

- 1) Move away from a one-size-fits-all approach and move toward a more suitable adaptive management strategy that embraces, understands and respects the complexity of drylands.
- 2) Management strategies need to work with within the dynamics of the drylands, not ‘fight’ against it. This means not trying to increase its productivity to match other high yield systems through technologies that are suitable for other ecosystems.
- 3) Management strategies need to recognize that droughts are not abnormal events in drylands. Management strategies that reduce the vulnerability of people, especially the poor and take into account the reality of droughts are best suited for the drylands.
- 4) Management strategies need to take into account the temporal dynamics underling dryland ecosystems. Mobility of people and flexibility of tenure systems may be necessary to accommodate these regular seasonal changes.
- 5) Management strategies must be designed that respect the different degrees, and types of use, of ecosystem services to ensure that no stakeholder groups are marginalized in the process. Recognizing that different stakeholders use ecosystem services in different ways and have different degrees of dependency on these services is critical. Some may have clear substitutes while others have limited options.
- 6) The focus must not only be on improving human well-being in terms of material wealth, this will have only limited success. Moreover, there can be a tendency for this to work for a minority who have access to the provisioning services provided by drylands but does not work while the majority are excluded from these provisioning and regulating services. This majority suffers the most when ecosystem services are depleted and when productivity falls during times of ecological stress.
- 7) These challenges are exacerbated by the diversity, variability and transitions that occur to characterize drylands. To help meet these challenges, an ecosystem management paradigm is emerging that considers how human use of an ecosystem can maintain both its functioning and productivity (White et al., 2002; Gunderson et al., 2002).
- 8) Combined with the above described efforts, attempts should be made to ensure policy coherence among and between policies at all levels.

In determining how to achieve all of the above, value judgments have to be made concerning equity and ecosystem stewardship. Toward these ends, and toward the reduction of poverty, an essential step is to better understand the ways in which human activities and well-being are related to ecosystem changes and services. Such an understanding and depth of knowledge will always be needed to inform and support responsible and far-sighted governance.

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