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**Thematic cluster for the implementation cycle**

2008-2009 – policy session

### **Policy options and actions for expediting progress in implementation: Drought**

**Report of the Secretary-General**

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<sup>1</sup> E/CN.17/2009/1.

*Summary*

Policies to reduce the impacts of drought need to be developed and adapted at all levels with the participation of all stakeholders. In addition to natural resources conservation and structural adaptation to climatic variability, policies that focus on exploiting alternative sources of water such as rain water harvesting, water treatment and reuse, including measures for water recycling and reclamation of waterlogged land will be crucial. More sustained impact can be ensured if policies are consistent with traditional community-based strategies for coping with the challenges posed by drought and climate change. Improving access of developing countries to drought-tolerant crop varieties is essential for agricultural production and food security in drought-affected regions. Traditional knowledge and methods in soil and water conservation need to be promoted as a cost-effective solution. Reducing pastoral poverty will require Governments, NGO's and development partners to shift their focus from relief efforts to strategies aimed at resource mobilization, infrastructure development and capacity building. Partnerships at various levels could result in increased investments in establishing early warning and monitoring systems.

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## **I. Introduction**

1. At its sixteenth session - the review session of the third implementation cycle 2008-2009, the Commission on Sustainable Development (CSD) conducted a review and assessment of progress achieved on goals in the selected cluster of issues of “Agriculture, rural development, land, desertification, drought, and Africa”, as contained in Agenda 21, the Program for the Further Implementation of Agenda 21 and the Johannesburg Plan of Implementation. The Commission identified constraints and obstacles as well as new challenges and opportunities to implementation in the selected thematic cluster of issues.

2. At its seventeenth session – the policy session of its current implementation cycle - the Commission will take policy decisions and practical measures to expedite implementation in the selected cluster of issues. The Commission’s session will be preceded by its intergovernmental preparatory meeting.

3. The present report is a contribution to the discussions at the intergovernmental preparatory meeting on policy options and possible actions to expedite progress in mitigating the effects of drought. It responds to the challenges and obstacles highlighted in the report of the Commission’s 16<sup>th</sup> Session. The cross-cutting issues, including the means of implementation, identified by the Commission at its 11<sup>th</sup> Session are addressed throughout the report. The report benefited, in particular, from inputs from the Food and Agriculture Organization of the United Nations (FAO), the United Nations Environment Programme (UNEP), the International Fund for Agricultural Development (IFAD), the United Nations Economic Commission for Africa (ECA), the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Convention to Combat Desertification (UNCCD) and from Major Groups. The report should be read in conjunction with the Secretary-General’s reports on agriculture, land, desertification, drought and Africa, which will also be before the Commission’s intergovernmental preparatory meeting. Where necessary, cross -references are made to the report.

## **II. Policies for Drought Management**

4. The impacts of drought can be reduced through the implementation of adaptation strategies and and measures to improve preparedness. While adaptation is generally been tackled through drought management plans and coping strategies, preparedness should mostly be managed through the development of climate predictions and early warning systems. China, for example, has developed an operational system for drought early warning for the North China plains that integrates drought models, remote sensing and meteorological data to produce a series of drought maps and reports.

5. Past attempts to manage drought risks have often been implemented through a reactive crisis management approach where ad hoc emergency drought responses are identified and

enacted as the drought develops. However, the severe human and environmental impacts of past droughts together with the increasing perception of climate change threats have led to more pro-active risk-based management approaches allowing for better drought monitoring, prediction and adaptation. At national as well as regional levels, comprehensive drought planning is now covering risk evaluation, impact assessments and impact management.

6. Many drought-affected developing countries are still encountering difficulties in integrating drought management plans and coping strategies with national development and budgetary frameworks. Weak institutional structures, lack of technical capacity, limited progress in mobilizing stakeholders' participation and investment, and lack of in-depth understanding of the benefits of effective drought management for poverty reduction and economic development continue to slow progress in effective integration in some countries.

7. Drought risks reduction policies and practices often take insufficiently into account social factors such as gender, age, and social and economic capacities. Women, children, the elderly, and the poor are especially vulnerable to the effects of drought. Special consideration must be given to these populations and those livelihoods least able to cope with drought.<sup>2</sup>

8. The USA, Australia, New Zealand, and India have developed successful models for developing and implementing drought policies and plans from the community to national levels. These models include a strong institutional infrastructure to support policy implementation. Likewise, the European Drought Center (EDC) which promotes collaboration and capacity building between scientists and the user community to increase preparedness and resilience of society to drought is a regional cooperation model that could be followed. EDC has become a virtual knowledge centre in coordinating drought related activities in Europe to better mitigate the environmental, social and economic impact of droughts<sup>3</sup>.

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<sup>2</sup> *Drought Risk Reduction Framework and Practices*: [www.unisdr.org/eng/about\\_isdr/isdr](http://www.unisdr.org/eng/about_isdr/isdr). - p.44

<sup>3</sup> <http://cordis.europa.eu/fp5/about.htm>

Box 1

**Reducing the vulnerability to drought and climate change: the GEF pilot project in Africa**

The Global Environment Facility (GEF) Strategic Priority on Adaptation is piloting a range of drought coping mechanisms in Kenya, Mozambique, Zimbabwe and Ethiopia to reduce the vulnerability of farmers and pastoralists to drought and future climate shocks. The components of these coping strategies include: (i) improving early warning systems, (ii) assisting governments in the implementation of drought management strategies and adaptation plans and integrating climate change/drought across sector policies, and (iii) providing opportunity for sharing information on successful outcomes . The project has allowed farmers and pastoralists to adopt diverse drought mitigation strategies such as agricultural diversification and building food and water reserves.

*Source:* Krause, M. (2005): “Coping with Drought and Climate Change”, Project Inception Meeting, Nairobi.

9. Building the resilience of farming and pastoral communities to drought has increasingly been recognized as an essential element of drought management plans. Evidence suggests that policies and measures that support resilience-building are particularly effective if they build on community-based traditional practices of coping with drought.

**A. Growing drought-tolerant crops**

10. High dependence on mostly rain-fed agriculture has rendered many developing countries particularly vulnerable to the impact of drought on rural communities, especially in Africa. Food shortages and even famine have resulted from a sharp drop in agricultural

production, high food prices, and increased water scarcity and variability. If farming communities are to adapt successfully to climate change, they will need crop varieties with greater tolerance to drought.

11. Research on and development of drought-tolerant crop varieties, mostly developed through regional and international partnerships, has yielded practical results. Working in cooperation with the International Maize and Wheat Improvement Center (CIMMYT) and national partners in sub-Saharan Africa, scientists of the Consultative Group on International Agricultural Research (CGIAR) have developed more than 50 such varieties, which are being grown in a total of about 1 million hectares. Researchers at the International Institute of Tropical Agriculture (IITA) have made significant progress in developing early maturing maize varieties that can grow in regions with short rainy seasons. As a result of the work of the Africa Rice Center and its national partners, rice varieties which are resilient to drought have been developed, which combine the high productivity of Asian rice with the ability of African rice to tolerate harsh growing conditions.

12. Many developing countries consider drought-resistant crops as promising adaptation option to increase food production and food security under extreme climatic conditions. There are noteworthy examples of successfully growing drought-tolerant crop varieties. Drought-tolerant barley developed at the International Center for Agriculture in the Dry Areas (ICARDA) is being grown in Syria, the Middle East and North Africa. Drought-tolerant crops developed at the International Center for Tropical Agriculture and being grown in Latin America have yielded roughly double the maximum yield that farmers get from commercial varieties grown under the same climatic conditions.<sup>4</sup> More than 75 varieties of cereals including drought-resilient crops have been released by the National Institute for Agricultural Research (INRA). These new varieties have allowed farmers to increase their grain yield of bread wheat and barley by 35 and 50% respectively over the years. For the last 20 years, yield improvement of cereals corresponded to an increase of 2-4 quintals per hectares.<sup>5</sup>

13. In Israel, researchers have identified through genetic research the factors that enable plants to tolerate and survive the harsh desert conditions of heat, drought and salinity. The discovery has led to the development of staple crops like corn and rice that can cope with the climate changes associated with global warming. Israeli experts estimate that by the year 2025, there would need to be an increase in crop yields by 40 percent to support the ever-growing world population.<sup>6</sup> This has the ability to counteract impacts of global climate change that results in a loss of fertile areas, and an increased amount of desert-like soil conditions.

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<sup>4</sup> Group on International Agricultural Research (CGIAR), CGIAR & Climate Change. Research & Impact: CGIAR on Global Issues (Briefing Dossier, 2007-2008).

<sup>5</sup> Climate Change and Drought Mitigation: Case of Morocco” Mohammed Karrou B.P. 415, INRA Rabat, Morocco [www.fao.org/sd/climagrimed/pdf/ws01\\_38.pdf](http://www.fao.org/sd/climagrimed/pdf/ws01_38.pdf)

<sup>6</sup> Israeli researchers close in on drought-resistant crops 11-Feb-2008, [www.mfa.gov.il/MFA/.../Israeli%20researchers%20close%20in%20...](http://www.mfa.gov.il/MFA/.../Israeli%20researchers%20close%20in%20...) - 53k -

14. Despite good initiatives such as the ones mentioned above, access of many developing countries to drought-tolerant crops remains limited constraining their ability to maintain food security at community and household levels in times of drought.

15. As vulnerability to drought has increased globally, greater attention has also been directed to seasonal cropping patterns and agricultural seasonal prices. Developed countries such as the USA are using seasonal indexes to calculate agricultural price forecasts to develop their marketing plans. In order to deal with crop seasonality, governments should consider the introduction of various cropping patterns. Many researchers today consider mixed cropping the most efficient land use strategy. In India, for instance, breeders are developing plant types in pulses and oilseeds with good compatibility with row crops. In the case of plantation crops, intercropping with pulses and fodder crops is common and has proven to be successful. To expand and sustain their agricultural markets, governments in developing countries also need to continue developing viable fertilizer industries.

## **B. Conservation and management of natural resources**

16. The central element of drought is water deficit with more competing claims on water for domestic, pastoral, industrial, agricultural and energy needs. Water deficits are primarily and directly linked to a steady decrease in rainfall and surface water resources. Projected climate change is expected to increase the intensity of the water cycle, with in particular more severe and prolonged droughts. This will increase risks of rapid depletion of surface water resources and will diminish the ability of groundwater to 'recharge' in already water-stressed drylands.

17. Water scarcity causes dislocation, ethnic tensions and disputes over cross border water use. The management of transboundary water resources, whether surface or groundwater, involves technical cultural, legal, economic and social dimensions that are linked by the hydrological cycle. It is essential to avoid potential conflicts that could lead to refugee situations and the exacerbation of regional conflicts by maximizing the potential for cooperation among countries and by diversifying livelihood strategies for vulnerable communities.

18. Managing the competing uses of water is an integral part of the planning for drought management taking into account surface water which flows in rivers or is stored in lakes and reservoirs. This can require measures to restrict, through cooperation with main actors, allocation of water from dam reservoirs to different uses. Priority should be given to domestic use. Other priorities should cover livestock and perennial crops. Water rationalization and conservation at all levels is key especially in irrigation and industrial uses. Restrictions of allocations from multipurpose reservoirs could be rationalized according to other factors like marginal economic values for other uses in agriculture, energy, industry, recreation or navigation as well as for the environment.

19. Inland wetlands constitute an important land and water interface and provide an opportunity to mitigate the effects of hydro-climatic variations. Lakes, surface water reserves

and groundwater reserves are a strategic source of water and should be used for development opportunities and to enhance resilience of semi-arid countries and water stressed communities.

20. Where depletion of groundwater is acute, special attention should be paid to the sustainable use of deep groundwater resources. National governments are required to put in place long-term strategies to protect existing aquifers. These strategies should include exploiting alternative source of water such as rain water harvesting and water treatment and reuse. In India for instance, rainwater harvesting is a tradition and has been practiced for centuries. Traditional water-harvesting techniques are used in West Africa to sustain agricultural production. Run-off water from an adjacent catchments being channeled to underground rainwater reservoirs (cisterns) remains an important source of water, e.g., in drylands of Jordan, Syria and Egypt. Rooftop water harvesting provides low-cost water for drinking and household uses for drylands communities in Latin America, the Middle East (and) sub-Saharan Africa, and Asia. Successful implementation of integrated water use strategies requires capacity-building, technology transfer and financial resources.

21. Water recycling, re-use and reclamation are also strategies for coping with chronic water scarcity in dry areas. A more positive perception of the public in respect of the use of reclaimed or recycled water for non-drinking purposes can be promoted through education and awareness-raising measures. Expanded use of economic incentives and demand management measures could lead to considerable water saving.

22. Several case studies in different countries clearly demonstrate that the present state of wastewater treatment and disposal and partial re-use on agricultural soils can cause significant environmental problems. There is need for strengthened local institutions and enhanced capacities to overcome these difficulties. There is also need to further develop and modify treatment systems to meet the demands of local climatic and cultural conditions. Training courses and pertinent information should be made more available to educate and train students in this complex field.<sup>7</sup> Towards this aim, a model to consider is the wastewater treatment research centre in Kuwait which was created to promote exchange of experience and technical know-how on the management of treated wastewater, particularly among Middle Eastern countries, and to foster studies and research on wastewater treatment and re-use, with a special focus on agriculture.

23. Strategies for sustainable land management and planning, as detailed in the Secretary-General's Report on Land <sup>8</sup>, can offer effective means of adapting to droughts. Conservation tillage systems have been proven effective in maximizing rainfall infiltration and storage of water in the soil, enabling even crops lacking supplemental irrigation to bridge severe dry spells. Building resilience in rain fed farming systems is also a means of water demand

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<sup>7</sup> UNESCO (2005): Water Programme for Africa, Arid and Water Scarce Zones. - <http://unesdoc.unesco.org/images/0013/001391/139124e.pdf>

<sup>8</sup> Secretary-General's Report on Land [Symbol]

management. More crops are produced per drop of water in resilient farming systems, which reduces the amount of water needed to produce food. Despite the opportunities to build resilience to mitigate droughts, it is impossible to escape from the severe drought years<sup>9</sup>.

24. Enhanced water management in agriculture requires the introduction of improved soil moisture conservation measures and a reduction in wastage of local irrigation water. Reduction in water wastage also brings additional benefit in terms of minimizing loss of applied nutrients, water erosion and pollution of surface and ground water. Many promising strategies for raising water use efficiency include appropriate integrated land water management practices. Irrigation technologies such as trickle/drip and Sprinkler irrigation have been generally found feasible in the more arid regions such as in the Punjab region of Pakistan<sup>10</sup>. These technologies are used for the irrigation of high value crops, such as fruits/nut trees, grapes, sugarcane, flowers, and vegetables and could be used in other drought-prone countries.

25. With the focus on mitigating the vulnerability of rural people, it is crucial to protect, integrate, enhance and validate traditional and local knowledge and practices in water conservation. There is need for a thorough understanding of the successes and failures of current practices, of the approaches to risk prevention, reduction or shifting of those faced with drought. Such knowledge is needed at grass root as well as national and international levels so that policies can be properly translated into actions that are rich in local content, planned in conjunction with local people. In Africa for example, practices such as: construction of ridges (bunds, "dinettes" or "dignes") with stones or earth and water pockets have proven to be successful and should be upgraded.

26. In countries that largely depend on agriculture for self-sufficiency and have seen their agricultural production devastated by floods and droughts in the recent past, an integrated and participatory approach to watershed management is essential. Bangladesh and other drought affected countries have been applying knowledge gained from a forestry project on sustainable development of upland water catchments and use of marginal agricultural land to help reduce soil erosion, protect natural resources and increase agricultural output in the country.

27. Conservation and management of scarce water resources need to be complemented by policies and measures to protect and rehabilitate land resources. Replanting logged areas with trees that are tolerant of higher temperatures, thinning drought-stressed forests and developing pesticides have shown to be successful in this regard. India, for example, has developed a participatory forest management approach with an aim to strengthen rural livelihoods by improving local natural resource base and by involving local populations in the protection and regeneration of degraded lands. Productivity is restored through tree plantations and soil and water conservation measures.

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<sup>9</sup> Resilience building and water demand management for drought mitigation, Johan Rockström (Sep 2003)

<sup>10</sup> Impact of Resource Conservation Technologies for Sustainability of irrigated Agriculture.

<http://www.jar.com.pk/pdf/11-Impact%20of%20Resource.pdf>

### C. Improving the livelihoods of poor communities including farmers and pastoralists

28. The social impacts of drought on vulnerable communities are enormous. In Ethiopia, a recent quantification of the economy-wide impacts of drought and of water resources variability has shown disastrous consequences on poverty, hunger, migration and social instability. In semi-arid countries, one structural adaptation measure is to promote more dynamic and sustained growth through more investments in multipurpose hydraulic infrastructure development. This would allow shifting towards a more water-resilient path. At the same time, and with the same level of priority, it is necessary to develop efficient institutions and interventions aimed at decreasing the vulnerability of the economy to drought shocks.

29. In addition to drought-tolerant crops and water conservation livelihood strategies for local populations should also include the introduction and support for income-generating opportunities as important incentive to farmers, including women farmers, in drought-affected areas to invest in sustainable agriculture and natural resources management and to reduce migration from rural to urban areas. There is a particular need to improve farmers' access to appropriate and affordable agricultural technologies and corresponding field training to increase food production and grow drought-tolerant crops, while maintaining soil productivity. FAO, for example, and the Asian Disaster Preparedness Centre (ADPC) started a project in 2006 to undertake an assessment of livelihood adaptation to climate variability and change in the drought-prone areas of northwest Bangladesh. The project developed a good practice adaptation option menu, and includes evaluation and field testing of locally selected options that provide income to communities<sup>11</sup>.

#### Box 2

#### **Integrating sustainable development and drought management in India**

The Indian Government developed the Indo-German Watershed Development Program between 1992 and 2001. The Program was widely successful in many regions of the country. It was particularly successful in Darewadi: after 5 years of restoration activities, 65% of previously denuded terrain were covered with trees and grass and grazing biomass increased by 170%. Crops such as maize, wheat, and other vegetables were being sustainably grown and irrigated hectares of land increased from 197 to 342 ha. The seasonal migration of villagers also ceased as a result of stabilized agricultural production and wages.

*Source:* World Resources (2005): <http://www.grida.no/wrr/047.htm>.

<sup>11</sup> Livelihood adaptation to climate variability and change in drought-prone areas of Bangladesh Developing institutions and options. R. Selvaraju A.R. Subbiah S. Baas I. Juergens Rome, 2006

30. The adoption of policies to convert degraded land into economic assets should be considered. The protection of drylands biodiversity represents significant economic and cultural assets and is important in combating land degradation and desertification. Restoration activities could include planting trees with medicinal plants and genetic material that have cosmetic, pharmaceutical or scientific value. Pecuniary returns from the sustainable use of such valuable plant species could help dry land rural communities in creating income generating opportunities and contribute to poverty eradication.<sup>12</sup>

31. Policies and practical measures are being implemented to improve access of small-scale farmers to local and global markets. The International Fund for Agricultural Development (IFAD), for example, and the African Development Bank are developing a Programme in Uganda to help farmers' access to markets through the development of infrastructure projects and technical assistance. To promote a sense of ownership, the decision-making process will involve grass root communities.

32. Women farmers are main food producers in developing countries and yet they are one of the most vulnerable groups. Their economic empowerment to produce more and to participate in policy formulation is critical to addressing poverty and food insecurity. Most small holder farmers in Sub-Saharan Africa are women in need for training and education reform especially in agricultural productivity and environmental preservation. Norway has developed a strategy for equality in the agriculture sector to encourage women to remain in the countryside by promoting diversified economic activities in rural areas and creating new job opportunities. The project aims at reaching a female participation of 40 per cent in all agricultural businesses and uses co-operation between local authorities and farmers' organizations to increase female participation in the sector. Norway also provides financial support to young female farmers and encourages females' participation in farm cooperatives.

33. Policies aimed at helping farmers mitigate droughts should include capacity –building. Training should enable farmers to determine the timing of planting. In the period preceding the droughts (during El Nino years) farmers may be advised to invest more in either drought resistant crops or in crops, which may be planted earlier in the year/season. This would allow crops to take root and be able to get deeper moisture by the time the drought starts. Since stream flow and water levels in basins are significantly impacted only when the drought persists for long periods of time, developing irrigation systems in drought-prone areas as backup to mitigate short droughts may be worthwhile investments. For short droughts, the irrigation source may be needed only for a short time (the first several weeks or months following planting) until the roots penetrate deep enough to access deeper moisture.

34. Policies in support of market development are important in the fight against poverty. The success of small holder farmers in selling their goods at competitive prices depends on their ability to access markets. In addition to intensifying efforts to expand road infrastructure,

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<sup>12</sup> National Forum on Combating Desertification and Promoting the Synergistic implementation of inter linked Multilateral Environmental Convention, Mongolia June 2001- summary of report

there is the need to find a way to resolve issues of unfair trade. Huge financial subsidies by developed countries to their farmers make it virtually impossible for small-holder farmers to effectively compete in the market place. This is an ongoing problem that needs to be addressed. The main incentive for small holder farmers to produce more than their family consumption is the prospect of selling the excess produce. If the markets are nonexistence, productivity would naturally decrease.

35. Since developed countries remain reluctant to cut back on farming subsidies, , governments of developing countries may wish to consider incentive programs of their own. A well targeted package of incentives by those countries whose economies are dependent on agriculture would be helpful, especially if such incentives focus on a few key agricultural products. Such incentives would provide needed support to the farmers in times of low productivity. Another way for governments of developing countries to invest in agricultural productivity is to pursue the expansion of local industry in food processing and food preservation technologies. This would reduce the pressure of trying to sell farm produce before they deteriorate, thus allowing farmers more time to market perishable produce. This strategy would also give farmers more control over the pricing of their produce.

36. To expand and sustain the markets, productivity needs to increase and remain high. Sustained and high productivity requires the use of fertilizers and other agricultural inputs. Governments in developing countries need to develop a viable fertilizer industry by strengthening demand and increasing supply. In some of the areas where the concept of using fertilizers has already been practiced fertilizer is very expensive mainly because the marginal cost of importing small quantities is very high. Also, the limited number of market participants concentrates market power in the hands of a few, who can more easily manipulate prices by manipulating demand and supply. Furthermore, local transportation of fertilizer is often not cost effective. Due to the poor road networks, it often costs less to ship fertilizers from a Western country to an African port than to move it the relatively shorter distance inland to the farmer. Governments need to develop national fertilizer strategies to promote the emergence of a sustainable fertilizer production and/or distribution industry.

37. In order for small-holder farmers to sell their goods at competitive prices, governments will have to facilitate the provision of agricultural inputs and technologies as well as financial incentives. Towards this aim, in Bangladesh, small farmers benefited from credits disbursed on highly concessional terms. In Nigeria, the Alliance for a Green Revolution and the International Center for Soil Fertility and Agricultural Development launched in October 2008 a project to bulk credit and support rural agro-dealers who operate small businesses that reach farmers in remote areas. Training in safe food handling and packaging will also be provided<sup>13</sup>.

38. Currently, coping strategies for drought are nomadism, feed stocking and shifting-grazing and livestock selling. Reducing poverty and improving sustainable livelihoods in the pastoral sector requires from governments and development partners improvement of livestock

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<sup>13</sup> <http://www.agra-alliance.org/content/news/detail/868>

production, and pastoralists' access to forage, water resources and to markets for livestock trade. Possibilities for promoting supplementation of livestock grazing with other feed should also be explored: Ethiopia started the practice of growing fodder banks as dry season feed reserves for calves and small ruminants. In Jordan, the system of allocating subsidized feeds has created a major incentive to increase herd sizes. Since forage resources cannot support large herds the desert is increasingly used to keep animals while sacks of feed are trucked in. The Ministry of Agriculture of Morocco also introduced animal feeds distribution to farmers to safeguard livestock and encouraged farmers to use the improve and adapted management packages to acquire subsidized inputs and agricultural equipment in order to secure 60 millions of quintals of cereals under moderately dry cropping seasons<sup>14</sup>.

39. Promoting other rural livelihood activities such as small agro-based activities, in addition to pastoralism, would be equally important and must be underpinned by investment in enabling infrastructure such as roads, rail links and marketing routes.

40. In Africa, for example, governments should also consider improving water supply as a solution to evening out the variability in precipitation that leads to periodic crashes in livestock numbers. Arid rangelands have generally been the object of extensive well and borehole implantation which has encouraged herd expansion beyond the capacity of rangelands to support them. Arid areas in Somalia and Ethiopia have also been the recipients of local investment to build cemented underground water cisterns or '*birkeds*' around which settlements often develop<sup>15</sup>.

41. Stock numbers can continue to be governed by the pastoralists' traditional strategy of enhanced mobility and accessible communications that optimize advantages and opportunities offered by changing climatic and episodic conditions. Grazing systems could remain essentially event-driven. Attention should however, be paid to understanding the special needs of pastoral nomads, particularly in terms of cultural values and the need to involve them in the processes of change and development with a potential to affect them<sup>16</sup>.

#### **D. Introducing index-based weather insurance schemes**

42. Drought has become an important risk factor in investment decisions of both agricultural producers and financial institutions working with farmers, making the development and use of investment schemes necessary with the inclusion of drought in financial risk management. Index-based weather insurance represents an emerging innovative market scheme for managing risks associated with drought.

<sup>14</sup> *Climate Change and Drought Mitigation: Case of Morocco*. [www.fao.org/sd/climagrimes/pdf/ws01\\_38.pdf](http://www.fao.org/sd/climagrimes/pdf/ws01_38.pdf)

<sup>15</sup> Sugule & Walker (1998); Tracking pastoralist migration: Lessons from the Ethiopian Somali National Regional State

<sup>16</sup> First published in Squires, V.R. & Sidahmed, A.E. (ed.) "Drylands. Sustainable use of rangelands into the twenty-first century." IFAD Series: Technical Reports. Rome: IFAD. Reproduced with permission

43. While traditional crop insurance schemes exclude the weather factor, index-based weather insurance contracts are written against an index that describes an established relationship between measurable weather variables, e.g., temperature and rainfall, and crop failure. Pilot programs of index-based insurance products for agriculture have been successfully implemented. In Ethiopia and Malawi, these insurance schemes have proven to be economically viable (see box below) in some pilot cases.

**Box 3**

**Introducing index-based weather insurance: the case of Malawi**

In 2005, 892 groundnut farmers in Malawi bought weather insurance to increase their ability to manage drought risk and in turn access credit for better inputs. The pilot program, while successful enough to be repeated in 2006, was conceived to be a win-win for all stakeholders. Weather insurance gave farmers the ability to mitigate drought risk and therefore secure access to finance and inputs for improved production as an alternative to lower-income subsistence farming. It also protected loan providers from weather-related production risks and allowed the banks to expand their lending portfolios into the rural areas in a managed way. With no regulatory impediment and with reinsurance potential, insurers, which in the past had limited and unsuccessful experience with traditional agricultural insurance saw the pilot as an exciting opportunity to re-engage with farmers.

*Source:* United Nations (2007): Developing Index-Based Insurance for Agriculture in Developing Countries. – In: Sustainable Development Innovation Briefs, Issue 2.

44. Initial experience with index-based weather insurance schemes suggests that their effectiveness depends on the presence of a network of secure and high-quality weather stations, and reliable information management systems. Currently, many drought-affected developing countries, in particular in Africa, neither have the expertise to design index-based products locally nor the facilities. An increased focus on technical training for participants in the insurance and finance sector is therefore needed.<sup>17</sup>

**E. Drought monitoring and early warning**

45. Understanding the underlying causes of vulnerability to extreme weather events has also been an essential component of drought management because the ultimate goal is to determine risk of drought for a particular location and for a specific group of people or economic sector.<sup>18</sup> There is need for comprehensive and integrated approaches to effective drought monitoring,

<sup>17</sup> United Nations (2007): Developing Index-Based Insurance for Agriculture in Developing Countries. – In: Sustainable Development Innovation Briefs, Issue 2.

<sup>18</sup> Drought monitoring and early warning: *Concepts Progress and future challenges*; [www.wmo.ch/pages/publications/showcase/documents/1006\\_E.pdf](http://www.wmo.ch/pages/publications/showcase/documents/1006_E.pdf). p.12

drought impact assessment and early warning. At the global level, the FAO Global Information and Early Warning System on Food and Agriculture (GIEWS) meets the requirements of an integrated information, monitoring and early warning system. The USAID- sponsored Famine Early Warning System (FEWS NET) represents a noteworthy regional system. FEWS NET focuses mainly on Africa, but also covers parts of Central Asia, Central America, and the Caribbean.<sup>19</sup>

46. At the national level, drought monitoring systems based on a single indicator or climatic index have, for example, been developed in China, Australia, and the United States. Each of these countries has developed unique monitoring systems to suit their needs and capacities to deal with drought. For examples, China relies heavily on the Standardized Precipitation Index to monitor drought occurrence, and Australia quantifies precipitation percentiles. The United States Drought Monitor (USDM) and the North American Drought Monitor (NADM) utilize multiple climate indices and indicators to assess drought conditions.<sup>20</sup>

47. Monitoring of meteorological and hydrological drought and early warning systems must have the capacity to forecast or to detect signs of changes with a certain level of probability in weather and climate, for example, in temperature and rainfall. This requires systems that integrate precipitation and other climatic parameters with water information such as stream flow, snow pack, groundwater levels, reservoir and lake levels, and soil moisture into a comprehensive assessment of current or forecasted drought and water supply conditions.<sup>21</sup> Attention needs to be paid to other critical economic and social indicators (market data such as grain prices and changing terms of trade for staple grains and livestock as an indicator of purchasing power in rural communities, threshold of migration of household members to search for work or for selling non productive assets).

#### Box 4

#### **Drought monitoring in the United States and North America**

Drought Monitoring for both the United States and for North America includes the collaboration and cooperation of many groups, agencies and universities. The United States Drought Monitor (USDM) is a weekly project that allows for the depiction of drought conditions across the country. The National Drought Mitigation Center (NDMC) along with NOAA and USDA share the responsibility for the information with the help of over 200 contributors each week. Data used consists of precipitation, drought indices, soil moisture, river/stream

<sup>19</sup> [http://www.un.org/esa/sustdev/csd/csd16/rim/escap\\_drought.pdf](http://www.un.org/esa/sustdev/csd/csd16/rim/escap_drought.pdf)

<sup>20</sup> [http://www.un.org/esa/sustdev/csd/csd16/rim/escap\\_drought.pdf](http://www.un.org/esa/sustdev/csd/csd16/rim/escap_drought.pdf)

<sup>21</sup> Drought monitoring and early warning: Concepts Progress and future challenges; [www.wmo.ch/pages/publications/showcase/documents/1006\\_E.pdf](http://www.wmo.ch/pages/publications/showcase/documents/1006_E.pdf). p.13

flow, satellite data, snow depth information and reservoir storage. These efforts have allowed for drought depictions for large areas based on information, data and feedback from those affected regions.

*Source:* Brian Fuchs, National Drought Mitigation Center, USDM,  
<http://drought.unl.edu/dm>

48. The development and improvement of relevant monitoring and preventive measures should include the promotion of full and open exchange of ideas and information and the dissemination of data on assessment, monitoring, and early warning systems for drought at international, regional, national and local levels. This encompasses the development of decision-support models for the dissemination of drought-related information to end-users and appropriate methods for encouraging feedback on climate and drought assessment products, and on other forms of early warning information. Training end-users about the value of this information in the decision-making process is essential. Once drought conditions are known, there should be dissemination of information on the severity of conditions, potential impacts, and possible mitigation or emergency response actions in order to better respond to drought conditions.<sup>22</sup>

49. Effectively gathering and sharing of this information among regions / sub regions is needed and will require the promotion of institutional development and the skills necessary for effective collaborative research and planning among relevant scientific groups (i.e. physical and social scientists), policy makers, and stakeholders. Where possible, scientists should also encourage the prudent adoption of climate and forecast information to foster a shift from reactive to proactive management of drought risks.

50. Drought-affected developing countries need assistance in establishing drought-monitoring systems and building early warning capacities to increase their ability to undertake informed decisions to respond to drought including drought impact assessments.

51. Networks should also continue to be established to support the sharing of basic climate and early warning across borders and regions. For example, the AGRHYMET Centre (a specialized center of the Permanent Interstate Committee for Drought Control in the Sahel) along with the African Centre for Meteorological Applications to Development (ACMAD) and the Niger River Basin Authority, is providing agro-meteorological monitoring services across western Africa in Burkina Faso, Cape Verde, Chad, The Gambia, Guinea Bissau, Mali, Mauritania, Niger, and Senegal<sup>23</sup>. Another regional drought-monitoring system and early warning established by the World Meteorological Organisation (WMO) and the United Nations Development Programme is the Drought Monitoring Centre (DMC) in Nairobi. DMC is responsible for climate monitoring, prediction, early warning and applications for the reduction

<sup>22</sup> Investing in Drought Preparedness by: The Water for Food team (Feb 2007)

<sup>23</sup> [http://www.unisdr.org/eng/about\\_isdr/isdr-publications/10-drought-risk-reduction/drought-risk-reduction.pdf](http://www.unisdr.org/eng/about_isdr/isdr-publications/10-drought-risk-reduction/drought-risk-reduction.pdf) and [www.agrhymet.net](http://www.agrhymet.net)

of climate-related risks in the participating countries of Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, Sudan, Uganda and United Republic of Tanzania<sup>24</sup>. These centers contribute to climate monitoring and prediction services for early warning and mitigation of the adverse impacts of extreme climate events on various socio-economic sectors in the region, such as agricultural production and food security, water resources, energy and health, and will enable users to put mechanisms into place for coping with extreme climate and weather-related risks.

52. There is need to enhance communities' effective use of seasonal weather and climate information to increase agricultural and livestock production. The rapidly improving prospect for early warning presented by remote sensing and climate forecasting are very important. The example of Mongolia shows how ordinary herders can listen to and make use of government funded scientifically driven weather forecasts. The scientific prospects for early warning vary by climatic region across the world. There is therefore a need to integrate technological early warning with a local understanding of drought and its impacts, with field level monitoring and with appropriate local level planning and action<sup>25</sup>

### **III. Strengthening the Enabling Environment for Implementation**

#### **A. Scaling up financial and technical assistance**

53. Reducing drought risk requires commitment to long-term investment of resources. Governments, the private sector, development partners and other stakeholders need to consider drought as a significant natural hazard and take action to cope with the challenges posed by it. Many studies have shown that investing in natural hazard preparedness and mitigation strategies is more cost-effective than relying solely on response activities. Hence, any investment in drought risk reduction, mitigation, and preparedness measures to reduce the effects of drought appears to be a good investment. Governments and other stakeholders should allocate adequate funds in their budgets for meaningful drought risk reduction efforts.<sup>26</sup>

54. In addition, national governments need to improve the investment climate for domestic and foreign investors, which many developing countries depends heavily on to strengthen the public and private institutions of financial governance. Capacity building requires urgent priority in the areas of financial analysis, contract dispute adjudication and corporate governance. These should be brought into deeper partnership with development assistance agencies and multilateral institutions with respect to both the strategy and delivery of such assistance.

<sup>24</sup> Drought monitoring and early warning: *Concepts Progress and future challenges*; [www.wmo.ch/pages/publications/showcase/documents/1006\\_E.pdf](http://www.wmo.ch/pages/publications/showcase/documents/1006_E.pdf). p.17

<sup>25</sup> Morton, J. (2001). Report of a Consultancy on Pastoral Risk Management; Report to the World Bank and Ministry of Food and Agriculture, Mongolia.

<sup>26</sup> *Drought Risk Reduction Framework and Practices*; [www.unisdr.org/eng/about\\_isdr/isdr-](http://www.unisdr.org/eng/about_isdr/isdr-) p.52

55. Countries should actively participate in the Financing for Development Initiative follow-up process which provides a good opportunity to bring relevant public and private sector actors together for a sustained look at how programmes of cooperation on risk management could be developed. These programmes should aim at strengthening institution building in developing countries in areas such as drought management, drawing on the comparative strengths and capabilities of development agencies, multilateral development banks, private financial institutions and academia.

56. Regional development institutions including regional development banks could also be encouraged to partner with the Global Environment facility (GEF) to create further opportunities to blend Bank lending for development projects (baseline financing) with grant and concessionary financing from GEF resources to protect the global environment in the areas of biodiversity, climate change (including adaptation), land degradation directly related to drought management.

### **B. Enhancing the value of traditional knowledge in drought management**

57. One of the most important principles of the Convention to Combat Desertification has been the recognition of the value of traditional knowledge in drought management that local communities and indigenous people have accumulated over time in their interaction with nature. Traditional and indigenous mechanisms and methods to cope with the impacts are well adapted to local conditions. There is evidence that traditional knowledge and methods remain an integral part of indigenous strategy for the development and implementation of drought management policies and measures at the local level.

58. Many government and local entities may lack the capacity and resources to support community-based efforts at drought mitigation. The ability to assess and incorporate local indigenous knowledge, capacities and needs into drought mitigation and preparedness strategies is essential in order to develop and implement equitable and community-based solutions. As gaps in capacity are identified, resources and expertise should be targeted to meet these needs. Appropriate long-term investment of financial and technical resources into capacity development and drought mitigation and preparedness activities will be required to sustain these efforts. For example, vulnerable communities in the drought-prone Tonk district of Rajasthan in India use traditional adaptation practices for drought management. These include: growing new crops such as vegetables, fodder and higher value medicinal crops for commercial sale; use of environmentally sound fertilizers (vermiculture); improved storage for fodder and food grains; and improved water conservation and harvesting techniques through bunding of fields, construction of anicuts and digging and deepening ponds and wells<sup>27</sup>.

### **C. Strengthening regional and international cooperation**

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<sup>27</sup> Institute of Development Studies (2005): Community Adaptation to Drought in Rajasthan  
<http://www.ids.ac.uk/go/bookshop/ids-bulletin/ids-bulletin-36-2005/ids-bulletin-36-4/case-study-2-india>.

59. Some regional mechanisms already exist and are engaging in capacity-building. The involvement of donor agencies and development organizations in providing assistance for preventive and humanitarian emergency response remains vital. The Swiss Agency for Development and Cooperation, for example, has a regional proactive strategy in operation and has provided US\$1.0 million/year from 2004–2008 to increase awareness for disaster reduction including drought mitigation; capacity to increase performance of risk assessments and contribution to disaster reduction; and support for development projects in Central Asia<sup>28</sup>. The European Commission has a general humanitarian plan of action to strengthen the capacity of local communities to foresee, respond to, and cope with drought. The continued involvement of other agencies in providing country-specific assistance is valuable. The multilateral development banks also have policies for disaster assistance which may be streamlined into development policies at regional and international levels.

**Box 5**

**Regional Cooperation for Drought Management in the Lower Mekong Basin**

In December 2006, The Mekong River Commission (MRC) under the regional framework for cooperation and collaboration with the MRC member countries (Cambodia, Lao PDR, Thailand and Vietnam) formulated the Drought Management Programme. Four key issues in drought management in the Lower Mekong Basin are: (i) drought forecasting (ii) drought impact assessment (iii) drought management policy, and (iv) drought preparedness and mitigation measures. The formulation of the Drought Management Programme process is a clear example that a coordinated effort of drought planning and management is needed at the regional level, promoting inter-governmental and inter-agency cooperation based on the integrated water resource management principles. Strengthening of such regional and international cooperation requires the concern and the role of participating countries, and the commitment of the countries concerned to such collaboration.

*Source:* [www.mrcmekong.org/download/Papers/dmp-paper-seawfoct071.pdf](http://www.mrcmekong.org/download/Papers/dmp-paper-seawfoct071.pdf)

60. Since the entry into force of the UN Convention to Combat Desertification in 1996, much attention has been given to strengthening the capacities of government institutions to enable more effective implementation of the Convention's mandate. There is therefore need to support UNCCD's efforts to advance these strategies by fostering greater awareness, public commitment, knowledge, and partnerships and to coordinate the implementation of drought mitigation and management measures. Support should include enhancing centers of excellence in drought monitoring and early warning systems, and improving systems of dissemination of meteorological, agro-meteorological and agro-climatic analyses, forecasts and warnings<sup>29</sup>.

Regional Cooperation on Disaster Management and Preparedness, Senior Officials' Meeting on Central Asia Regional Economic Cooperation 28–29 August 2006

<sup>29</sup> Drought management and Mitigation Assessment for Central Asia and the Caucasus regional and Country Profiles and Strategies; 6 December 2006

#### **IV. The Way Forward**

61. The global economy has become increasingly sensitive to the fluctuations in weather and climate, thus making drought management a complex challenge. Overcoming this challenge require implementing sound policies and measures, involving different actors at various levels of implementation.

62. An important first step in this direction is to improve drought forecasting by establishing appropriate drought monitoring and early warning systems duly supported by capable national institutions, with necessary technical backstopping from international institutions. In this regard, systematic collection and analysis of updated, accurate and timely information on climate, weather, river flows, water stocks and soil moisture can enhance countries' capacities to deal with uncertainties stemming from lack of information for drought-related planning and decision-making.

63. To complement above capacities, the national governments need also to: (i) improve their seasonal forecasting skills, taking into consideration agro-climatic zones, and (ii) improve their information dissemination systems. Such dissemination systems and mechanisms need to be geared towards providing updated information to farmers, water and energy utilities, municipalities, and local communities—so that they are able to take appropriate steps for coping with the drought events, including actions to manage water stocks.

64. Improved capacities realized as a result of above actions will greatly enhance the effectiveness of planning, monitoring and implementation of drought management plans and coping strategies, including their impact. To achieve capacity building objectives, the governments need to tap the resources and expertise from North-South and South-South cooperation and partnerships.

65. Improving access of developing countries to drought-tolerant crop varieties is essential for agricultural production and food security in drought-affected regions. On-going research efforts on development of drought-tolerant crop varieties and inter-cropping systems should be intensified and broadened at national and regional levels.

66. To cope with the risks posed by drought, the national governments need to integrate sustainable development and drought risk reduction programs including climate variability into climate change adaptation strategies. There is also a need to promote increased awareness of the importance of water policies in managing response to climate change, which may require global cooperation. Nevertheless, drought-prone countries need comprehensive water resources conservation and management strategies to help mitigate the effects of drought. Water rationalization and conservation will be needed at all levels and in all uses, but with special emphasis on the agriculture sector.

67. Employing a proactive, risk-based approach in drought management has proven to be effective in preventing or reducing the physical or economic losses associated with drought and climate change. It requires drought management plans and coping strategies that integrate mitigation, adaptation and preparedness in a systematic manner. These integrated plans and strategies offer valuable platforms for awareness-raising, the development of cross-sectoral policies at the national level, structural adaptation to climatic variability with more investments in multipurpose hydraulic infrastructures and for the mobilization of resources needed for their implementation.

68. Policies in support of market development are important in the fight against poverty. It is vital to improve access to markets for farmers, including the women among them. This may be pursued through the elimination of subsidies that make it virtually impossible for small-holder farmers from developing countries to compete in the market place.

69. Enhanced access to appropriate and affordable technologies and corresponding capacity-building for the effective management and conservation of land and scarce water resources would assist farmers and pastoralists to maintain food production and food security under drought conditions, while, at the same time, enhanced access to technologies and capacity-building will encourage them to invest in soil and water and conservation. Traditional knowledge and methods in soil and water conservation need to be further encouraged as a cost-effective solution.