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Report of the fifth meeting of the Group of Experts of the Committee on Science and Technology

Note by the secretariat*

Addendum

Identification of perceived gaps between biophysical, socio-economic and cultural knowledge and activities to combat desertification, their causes and ways of eliminating them

Summary

There is a considerable qualitative gap between scientific knowledge and local traditional knowledge in dryland areas. Scientific knowledge includes both biophysical and socio-economic disciplines, between which there are also wide gaps. This document describes the concept of traditional knowledge and the common approach to technology transfer that countries have adopted. It also highlights the need, and ways, to integrate traditional and modern knowledge as a strategy to combat desertification more effectively. It then makes recommendations for ways to bridge the gap between these two bodies of knowledge, through reorienting research and extension services and involving local communities in the fight against desertification.

* The submission of this document was delayed due to the short time available between the fifth session of the Committee for the Review of the Implementation of the Convention and the eighth session of the Conference of the Parties.

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I. Introduction

1. The Conference of the Parties (COP), by its decision 15/COP.6, requested the Group of Experts of the Committee on Science and Technology (CST) to prioritize its work programme as contained in the framework annexed to that decision. This was to be done in the light of the comments, observations and recommendations made by the CST at its sixth session, and in particular on the basis of feasibility and relevance to the implementation of the Convention. One of the tasks was to identify perceived gaps between biophysical, socio-economic and cultural knowledge and activities to combat desertification, their causes and possible ways of eliminating them.

2. This document provides an overview of the existing gaps between different bodies of knowledge (i.e., traditional and modern) that hinder efforts to combat desertification. It also summarizes several proposals – made by the COP, its CST, and individual authors that have collaborated with the UNCCD secretariat or other bodies of the Convention – that provide new insights to ways of conducting research and technology transfer with the aim of furthering the implementation of the Convention.

II. Traditional knowledge

3. Traditional and local technical knowledge, know-how and practices, often collectively referred to as traditional knowledge, represent accumulated cognitive and perceptive experiences of interactions between a group of people, their physical and biological environments, and production systems. The quality and quantity of traditional knowledge varies among community members, depending on gender, age, social status, intellectual capability, and occupation (hunter, spiritual leader, healer, etc.) or trade. Language, religion, biophysical imperatives, and sociocultural aspects (e.g. tenure and environmental traits) are important driving forces in shaping these practices.

4. Traditional knowledge consists of practical (instrumental) and normative (enabling) knowledge about the ecological, socio-economic and cultural environment. It is people-centred (generated and transmitted by people as knowledgeable, competent and entitled actors), systemic (intersectoral and holistic), experimental (empirical and practical), transmitted from one generation to the next, and culturally valorized. This type of knowledge promotes diversity; it valorizes and reproduces the local (internal) resources.

5. Some traditional knowledge is ignored by modern development and scientific institutions. It is only in recent decades that this knowledge has been recognized by the western scientific community as a valuable source of information. Today, scientists, community-based organizations (CBOs) and non-governmental organizations (NGOs) working with local communities have compiled a large body of traditional knowledge associated with different production systems and agrarian typology.[1] But very little validation and appraisal for efficacy and sustainability has been done, and vast quantities of information remain undocumented.

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[1] For a review of COP decisions on, ad hoc panel reports about, and a compilation of techniques of traditional knowledge see "Promotion of traditional knowledge: A compilation of UNCCD documents and reports from 1997 to 2003". 2005. ISBN 92 –95043 –03 0. 156 pp.

6. Traditional knowledge is part of a complex system and cannot consist of a simple list of technical solutions and be limited to a series of different applications varying according to the results obtained. Its efficacy depends on interactions among several factors that must be carefully taken into account if successes accomplished in the past by making use of traditional knowledge and its logic are to be understood for contemporary application. The compilation presented by the UNCCD shows that traditional knowledge varies depending on goals and functions. Many traditional knowledge practices have been classified as ‘site amelioration practices,’ ‘water conservation practices,’ ‘agricultural practices,’ etc. Some of these specific techniques could have been in use for thousand of years, and some could have been forgotten after falling into disuse. The important issue is that whichever technique is used today, be it traditional or modern, it must be appropriate.

III. Technology transfer

7. It is also necessary to consider ways of transferring modern techniques such as water-saving methods, greenhouse cultivation, solar energy development, biogas generation and use, mechanization of afforestation and of harvesting fodder, new artificial materials for fertilizing soil and improving its moisture-holding capacity, newly developed soil conditioners for use in regions with limited precipitation, newly developed chemical agents to control water release and conservation, the application of root-generating chemicals to increase the quality of seedlings, and thousands of other modern technological designs, techniques and advanced measures.

8. A central issue is, then, not the existence of techniques but the way in which knowledge can be effectively transferred to the farmers and pastoralists who need to combat desertification.

9. Several articles of the Convention deal with the transfer of technology. Article 6 commits developed country Parties to promote and facilitate access by affected country Parties to appropriate technology, knowledge and know-how. Article 12 states that affected country Parties, in collaboration with other Parties and the international community, should cooperate to ensure the promotion of an enabling international environment covering, inter alia, technology transfer. And in article 18 Parties undertake to promote, finance and/or facilitate the financing of the transfer, acquisition, adaptation and development of environmentally sound, economically viable and socially acceptable technologies relevant to combating desertification and/or mitigating the effects of drought.

10. Technology transfer basically means the transfer of knowledge, methods, techniques and skills – ancient or modern – to locations or contexts different from those where the knowledge, technique, etc., was created. It has a broad definition and can cover land management practices and techniques for soil and water conservation, as well as protected-area management systems, pastoral systems, silvicultural (agroforestry, afforestation, reforestation) practices, genetically superior planting material, efficient harvesting, processing, and indigenous knowledge.

11. There is a challenge to the scientific community – social scientists as much as physical scientists – to put itself at the service of communities in dryland areas. “Demand-driven” science is a daunting challenge requiring a change in mindset and a different appreciation of the concept of technology transfer. A new philosophy of technological cooperation needs to replace the traditional top-down paradigm of technology transfer. One of the keys to successful technology

transfer is building a cooperative partnership, beginning at the local level. And it also needs intergovernmental cooperation, networking, private–public partnerships, small-scale enterprises, targeted training, direct public investment, financial incentives, enabling policy measures and education.

12. These categories could be further classified as **government-driven pathways** where technology transfer is initiated by government to fulfil specific policy objectives; **private-sector-driven pathways** which involve transfers between commercially oriented private-sector entities (which have become a dominant mode of technology transfer in the world today); and **community-driven pathways** where technology transfers involve community organizations with a high degree of collective decision-making.

13. Technology is transferred as knowledge, resources (investment) and goods (remote sensing equipment for example) that flow among different stakeholders: governments, private-sector entities, financial institutions, NGOs and research/teaching institutions. The success of the transfer through a particular pathway will also depend on the promotion (ways and means) and the selected policies of governments.

14. The most frequently identified constraints to access to appropriate technology, knowledge and know-how are:

(a) Weak networking among scientific institutions;

(b) Limited exchange of data and work carried out at varying geographic scales;

(c) The chronic shortage of financial resources and limited access to appropriate technology, knowledge and know-how;

(d) The results of research, when available, often not being meaningfully absorbed by decision makers or end-users of natural resources.

IV. Integrating traditional knowledge with modern technologies

15. An aspect that would improve the efficacy of combating desertification is the integration of technologies. Several authors cited by the UNCCD[2] (see footnote on page have outlined several approaches that would foster such integration. The main concepts of these approaches are outlined below.

16. In the first approach, natural scientists, anthropologists and development experts may take certain elements of traditional knowledge and incorporate them into the body of Western expert knowledge. Such hybrid knowledge is subsequently disseminated to farmers and local people in a wider geographic extent. Even though this approach may yield important technical facts, it simply replicates existing power relations and the primacy of Western expert knowledge within the development framework. Moreover, it should be remembered that traditional

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[2] See “Promotion of traditional knowledge: A compilation of UNCCD documents and reports from 1997 to 2003”. 2005. ISBN 92 –95043 –03 0. 156 pp.

knowledge is highly location-specific and based on close observation over a long period of time. It is embedded in culturally based value systems, systems of production and consumption, and ways of living and relation to natural environment.

17. A second approach is the “knowledge system view” where two types of knowledge – Western scientific and traditional knowledge – are distinguished on the basis of their characteristics. Traditional knowledge is personal, particular, intuitive, implicit and orally transmitted. Western scientific knowledge is analytical, impersonal, universal and transmitted in written form. This approach validates the relevance of non-Western cultures and their respective knowledge systems holistically. At the same time, it recognizes the problem of its appropriation by Western scientists. Informative comparisons and revealing accounts of the interaction between Western and traditional knowledge systems have been produced. However, the approach is conceptually seen in a dualistic and somewhat opposing relationship.

18. A third approach is the so-called “actor-oriented approach” where the dualistic distinction between Western and non-Western knowledge is abandoned. The objective is an elucidation of the actor’s own interpretations and strategies, and how these interlock through processes of negotiation and accommodation. It is emphasized that our understanding of all knowledge is partial and based on a particular perspective. What is needed in this approach is a set of methodologies for handling the complex relationship evolving in development interventions that would allow for a more differentiated understanding of how bodies of knowledge shape struggles and negotiations between local groups and intervening parties. Here, intervention is seen not as a linear process of implementing a plan of action, but rather as an ongoing transformation by which knowledge is negotiated and jointly created through social encounters in which certain power dynamics are operating.

A. Possible problems

19. Some authors argue that cross-cultural communication has always been an obstacle to positive interaction between local communities and the outsider. Each side has its own filter or frame of mind through which people perceive and make sense of the situations before them. Although this idea is better understood today, its extreme importance to agricultural development is not. Much of the logic and belief that makes farming behaviour “rational” is implicit even to possessors of that knowledge. Therefore, an outsider can easily miss key elements to conclude that actions are not rational. Anthropologists, and particularly ethno-scientists, have developed a theory and techniques to elicit components of the knowledge system and make concepts and principles clear and relevant to outsiders.

20. Other authors believe that a good portion of the problem can be attributed to the fact that traditional knowledge systems, for the most part, have never been recorded systematically in written form. As such, they are not easily accessible to agricultural researchers, extension workers and development practitioners. Hence, by recording these systems, outsiders can understand better the basis for decision-making within a given society. Furthermore, by comparing and contrasting traditional knowledge systems with the scientific technologies generated through international and national research centres, it is possible to identify where exogenous technologies can be utilized to improve endogenous systems.

B. Effect on the market

21. There is a general tendency to support the notion that traditional cropping and pastoral systems, if judged by environmental and livelihood criteria, have often been superior to modern ones that depend on new technologies and the purchase of many externally produced inputs. Traditional knowledge production systems were often less risky and more equitable, and made fuller productive use of available human and natural resources. There is no doubt that modern science and technology can make a big contribution to improving cropping and pastoral systems, but introducing modern technologies without their negative social and environmental impacts is much more difficult and complex than has been widely assumed.

22. To the extent possible, improved farming systems should be based on the accumulated knowledge and experience of the local communities. Moreover, low-input production systems tend to be advantageous because they are less disruptive of traditional social systems and minimize dependency of local people on the volatile terms of trade in national and international markets. Intermediaries and officials at all levels also often exploit small farmers and pastoralists dependent on a high proportion of externally purchased inputs.

23. On the other side of the equation, three considerations emerge from the rational facts of life. First, outside entrepreneurs will not stop trying to exploit local communities, whenever profitable opportunities exist in national or international markets. Second, many traditional or transitional farmers and herdsmen will want to enjoy the convenience and perceived benefits of labour-saving machinery, chemical inputs and consumer goods such as television and cars. Third, local farming systems everywhere are becoming increasingly influenced by the production and consumption patterns that are dominant in national societies and in industrialized countries.

24. Industrial production systems increasingly dominate the national and international markets. They largely determine what is available commercially, and at what price, in the way of consumer goods, production inputs, capital goods, and technologies. In such circumstances, self-reliance as a declared objective of some local community or a country should not compromise the question of sustainability. This question will not be resolved unless the relevant social and ecological issues are resolved.

V. Ways of bridging the gaps

25. There is a considerable qualitative gap between scientific knowledge and traditional knowledge in dryland areas. Scientific knowledge includes both biophysical and socio-economic disciplines, between which there are also wide gaps. Some possible ways to close these gaps, for the benefit of all parties, are outlined below.

26. The technology transfer model continues to be the dominant paradigm. In this model researchers generate new or improved technologies, which are transferred by extension staff to farmers. Practice shows that technologies generated in this way are not acceptable to most small-scale farmers, especially in semi-arid areas, for many reasons; for example, they can be too expensive for the millions of small-scale farmers who cannot afford the investment in a package of inputs, or the technologies are not well adapted to the specific agroecological conditions in

which the farmers are working. As the world population continues to grow, and many farmers do not accept the technologies offered to them by the conventional research and extension system, it is important to explore new approaches.

27. It is necessary that documented and validated traditional knowledge be integrated with modern scientific knowledge as well as with the latest resource management techniques that are applicable to a given area. As a prerequisite to this, a concerted community action should be initiated to compile an inventory of the relevant traditional knowledge system.

28. CBOs and NGOs should have a prominent role in this undertaking. Such collected traditional knowledge systems can provide scientists with a major source of information, a framework for interpreting information and data, and a way of solving some of the problems they may encounter in the field.

29. The following are some of the key tasks that have been suggested in crafting a demand-driven scientific agenda in order to accommodate a particular approach or technology transfer technique.

A. Identifying research-based technologies

30. Farmers, pastoralists and scientists each know and understand many things, but have little overlap between their domains of knowledge. Therefore, farmer–scientist or pastoralist–scientist interaction is the best way to help both groups to learn simultaneously. Involving research-minded community individuals during the phase of identifying research-based technologies is highly recommended. These individuals are encouraged to ask questions about the available technologies and to decide which one(s) they want to test. During the experimentation, community representatives must be allowed to use their evaluation criteria to assess the tested dryland management technologies. The final conclusion will be based on compatibility with ecological conditions, the need for institutional support, profitability, risk involved, and the need for external resources. Approaches such as participatory rural appraisal and participatory technology development can be used to effectively involve the community in determining research needs and in identifying appropriate innovations and techniques.

31. The results of farmer and pastoralist experimentation would be the baseline for disseminating the recommended dryland technologies on a wide scale. During the dissemination phase, sociocultural, economic and institutional factors should be assessed to confer credibility and replicability on the integrated or hybrid technology. The role of CBOs and NGOs in the different phases of this process is indispensable. With such integrated teamwork, combating desertification in the dryland areas would certainly be cost-effective.

B. Reorienting extension services in affected developing countries toward participatory approaches

32. Developed country Parties should provide developing country Parties with further access to new technologies and know-how for the implementation of their action programmes. Research institutions in affected country Parties need to be strengthened to develop innovative approaches and technologies, taking due account of, and adapting, as appropriate, traditional knowledge and

knowledge systems of indigenous people, to develop both preventive and curative measures. Traditional knowledge and indigenous knowledge systems addressing local problems must be more systematically used, and innovations based on such knowledge should be encouraged and, where appropriate, in combination with modern technologies, adapted to local conditions. Findings must be recorded and shared.

C. Extending technological cooperation

33. Best practices should be actively promoted. South–South and North–South cooperation as well as regional and subregional initiatives, backed by scientific research, deserve more consistent support in the form of capacity-building and financial allocation. South–South initiatives for promoting training programmes would also welcome triangular arrangements with partners from the north and/or United Nations agencies as well as intergovernmental organizations (IGOs) and NGOs.

34. Well-designed projects and activities having technology transfer components can contribute and extend to other environmental impacts, such as biodiversity conservation, watershed protection, and socio-economic benefits to urban and rural populations through access to agroforestry products and the creation of jobs, ultimately promoting sustainable development and amelioration of land degradation and desertification.

35. Governments and the private sector in affected developing and developed countries, as well as multilateral agencies, have a critical role in extending technology cooperation and setting up financial and regulatory mechanisms. Governments could prepare guidelines and set up institutional mechanisms to process, evaluate, sanction and monitor sector mitigation and technology transfer projects in both North–South, and South–South contexts.

D. Intra- and intergovernmental cooperation in South–South collaboration

36. Countries which require financial resources, infrastructure, trained personnel and expertise may benefit from pooling resources among themselves to obtain the information and technologies they need. This may be through South–South cooperation, or among the countries within a particular region or subregion. This cooperative approach to technology transfer may increase the quality and level of information and technology that can be obtained.

E. Networking

37. Countries sharing common resources (for example, catchment basins, mountain ranges) or common problems can cooperate to achieve an efficient pooling of resources and accomplish what no single country could alone. Intrasectoral cooperation has also been successful within larger countries (for example, agricultural research stations in different regions, with shared computer systems for accessing satellite data or traditional information sources). Networks are an effective mechanism for pooling and sharing government resources but can also be an effective and cost-efficient structure for donor-supported activities. Activities such as the networking of scientific institutions, exchange of expertise, technology transfers, training at universities, and internships and scholarships in desertification should be systematically

promoted through subregional actions programmes (SRAPs) and regional action programmes (RAPs).

38. Cooperative arrangements of this type can make important contributions to education, training, infrastructure development and institution building. Features of successful technology transfer under this approach would include having common goals and using common methods, a commitment by all partners, a neutral administrative structure and private–public partnerships.

1. Common goals and common methods

39. It is essential that all cooperators share common goals and that the goals be clearly addressed by the specific information or technology to be shared by the institutions or individuals. International agencies, while providing advanced information from satellite remote sensing, need to ensure that the information is provided in an appropriate form and is focused enough to address the specific needs of individual countries. The technology must be sufficiently flexible to provide useful results at many different levels of technological development.

2. Commitment by all partners

40. Building a base of trained and experienced personnel with the supporting technical infrastructure requires serious financial investment and long-term commitment of personnel and institutional support. Potential cooperators must be willing to make a commitment to a sustained effort before being allowed to participate. Programmes require commitment in order to succeed.

3. Neutral administrative structure

41. Successful cooperation requires that all partners be treated equally and that none dominates the resources or the selection of goals. To avoid any single partner dominating the cooperative, structures with neutral and independent administration or rotating leadership are essential. Care must also be taken to respect and legally protect the intellectual property rights of participants.

4. Private–public partnerships

42. The private sector can make major, mutually beneficial contributions to research and development (R&D) and infrastructure building in ways that support an integrated approach to land management. The mechanisms by which this can occur are highly varied:

(a) A banking credit can assist in implementing proven technologies or developing new technologies. Successful investment programmes based on community lending and women's cooperatives show how capital can be provided to support technology transfer.

(b) Joint private–public support for R&D institutes to develop new technologies or products, or to investigate specific issues of importance to the private sector, is already implemented in many developed countries, as well as in some developing countries. This type of private investment goes hand in hand with market development and will tend to increase as markets develop.

(c) Fellowship programmes can build in-country expertise.

(d) Companies offering product incentives can help develop markets while making technology available and providing experience and training. For example, with the purchase of a certain product, schools and municipalities might also receive computers or technical training. Public–private partnerships may prove effective in technology transfer, particularly as national and international corporations adopt the long-range goals of sustainable development.

F. Small-scale enterprises as catalysts for technology transfer

43. Many governments and development organizations have focused on the promotion of small-scale enterprises (SSEs) as a way of encouraging broader participation in the private sector. The promotion of SSEs, and especially of those in the informal sector, is a viable approach to sustainable development. In Africa, great creativity has been demonstrated in starting enterprises with minimal resources. SSEs have characteristics that justify promoting them in a development strategy. They create employment at low levels of investment per job, lead to increased participation of indigenous people in the economy, use mainly local resources, promote the creation and use of local technologies, and provide skills training at low cost to society.

44. SSEs face unique problems which affect their growth and profitability and hence diminish their ability to contribute effectively to sustainable development. Many of these problems have implications for technology transfer. Lack of access to credit is a key problem for SSEs.

G. Targeted training and technology-support programmes

45. Unsustainable land-use practices constitute one of the major threats to sustainable food production on much of the world’s marginally productive lands. Specifically targeted application of technology can help remove the primary constraint on planning for sustainable land use – lack of information. Effective integration of land-use planning activities may be hampered at the village level by, for example, a lack of necessary information, but it can be facilitated by local training programmes on data collection and assessment, together with the provision of appropriate tools and technology.

H. Direct public investment in resource protection

46. Stopping unsustainable land uses before they permanently degrade the land’s carrying capacity may require public-sector promotion of sustainable land uses. Governments often make major investments in economically marginal regions. For example, over the centuries Governments of the Netherlands have made massive investments in the dyke and canal infrastructure which provides protection for cities and agricultural regions far from the locations where the investments have actually been made.

47. Similarly, the Government of China has supported extensive tree-planting programmes in semi-arid regions to prevent wind erosion and dust storms that cause serious problems in major urban areas to the east. Appropriate agricultural policy incentives can help to ensure sufficient

input of resources in marginal regions to allow sustainable agricultural practices, rather than continuing land degradation. Direct investments in specific land uses to support the economies of marginal regions may offer cost-effective solutions to problems caused by unsustainable land use.

I. Allocation of financial resources as incentives

48. Adoption of sustainable land management practices and efficient processing and recycling technologies could be promoted by providing financial incentives such as preferential market access, lower taxes or duty, and low-cost credit to companies adopting such technologies. An initiative by the World Food Programme and the International Fund for Agricultural Development in Kenya in 2003, the “Fund for disaster preparedness activities”,’ shows technology cooperation through the use of a monetary fund for projects on soil and water conservation, new technologies and tools to pastoral communities and new livelihoods. Food assistance complemented technical input and financial resources.

49. Also, the role of the Global Mechanism (GM) in technology transfer is, inter alia, to identify and provide information and advice on financing sources for the transfer, acquisition, adaptation and development of environmentally sound, economically viable and socially acceptable technologies.

50. Technology transfer within the work facilitated by the GM includes support to civil society through its Community Exchange and Training Programme (CETP). The CETP aims at facilitating the contribution of civil society to national action programmes (NAPs) and SRAPs. Another activity is the support through the German Technical Cooperation Agency (GTZ) for the formulation of a project by the Sahara and Sahel Observatory (OSS), GTZ and the GM on the use of remote sensing for monitoring and management of water resources, thus promoting new opportunities for resource mobilization for technology transfer.

J. Enabling policy measures

51. Improved capability for policy review and evaluation by decision-making bodies at all levels is essential in developing an integrated land-use plan for sustainable development. Effective policy evaluation requires accurate information on current land conditions and on the capability of the land to support the future needs of society, including agricultural production, energy sources, mineral resources, clean and abundant water supplies, wildlife and conservation, and recreation and tourism. Countries may consider it beneficial to adopt appropriate policy and regulatory measures to safeguard sustainable land management and the sustainable use of natural resources. Such measures would also be geared to ensuring efficient processing, recycling of agricultural and forest products, product certification, and regulating a number of industries, among other things. This could improve the transfer of technologies for sustainable practices, high-yielding agricultural crops and efficient processing technologies. Regulations to enhance the coverage of protected areas would ensure the transfer and adoption of suitable protected-area management practices.

52. Regarding new and renewable energy sources, countries experience difficulties in discerning the interconnection between renewable energy and desertification, despite their efforts

to ensure that their various energy, forestry, land and water policies are properly coordinated. The technology for the use of these renewable energy sources has been developed but its application has been impeded by several factors, including the excessive cost of certain back-up components, lack of the necessary background skills for maintenance of these back-up components, and insufficient political and economic support for initiatives to promote new and renewable energy sources.

K. Awareness, education and capacity-building for technology development, transfer and assimilation

53. It is necessary to create awareness among the various stakeholders, including local communities, NGOs and the general public, in order to have an enabling environment where technology development, transfer and diffusion can be facilitated. An enlightened public is more likely to accept measures to address land degradation and to adopt sustainable land management practices. Equally important is building the necessary capacity at all levels, individual and institutional as well as systemic, with a view to creating the conditions conducive to appropriate technology.

VI. Conclusions and recommendations

54. The value of both traditional and modern knowledge increases as appropriate technologies are made available to an extended number of farmers and pastoralists in areas affected by desertification. To date, however, research/extension centres continue to use the top-down approach for research and technology transfer, thereby preventing the end-users from taking part in the process. Instead, a demand-driven approach is seen as a plausible way to bridge the gap between researchers, extension experts, and farmers and pastoralists.

55. In order to effectively combat desertification, country Parties should implement a series of initiatives to incorporate community needs. After implementing them, affected communities would have access to a coherent body of knowledge (or wisdom) comprising traditional and modern techniques. The initiatives are:

(a) Identifying and documenting appropriate technologies, traditional or modern, by involving the affected community;

(b) Reorienting research and extension services towards participatory approaches, abandoning the prevailing top-down model;

(c) Seeking and promoting intra- and intergovernmental cooperation;

(d) Creating networks among countries to share efforts and information. Intracountry networks should facilitate the use of technological resources and expertise;

(e) Facilitating private–public partnerships for the promotion of research and development;

(f) Promoting small-scale enterprises, and the participation of women and young people;

(g) Targeting training specifically to affected areas on issues such as land-use planning and use of appropriate technology;

(h) Promoting public investment in the protection of natural resources;

(i) Reviewing and harmonizing public policies and programmes in order to develop an integrated plan for sustainable development;

(j) Building capacity for technology development and transfer.

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