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# MEETING REPORTS

## Marine Harvest Refugia for West Coast Rockfish of North America, A Workshop

*Held at NOAA–NMFS Pacific Fisheries Environmental Laboratory, Pacific Grove, California, during 17–19 September 1997*

The multi-species rockfish complex (Sebastes spp.) is amongst the most valuable fisheries along the west coast of North America. After landings peaked dramatically in the mid-1970s to mid-1980s, exploitation rates remained high and biomass and size composition have decreased alarmingly for many species. Clearly traditional management alone is not successfully sustaining these resources.

A workshop, sponsored by the National Marine Fisheries Service (NMFS) Office of Protected Resources, was convened specifically to (i) assess the current and future needs, benefits, and implementation of harvest refugia to protect and manage rockfish populations, and (ii) develop recommendations for establishing and monitoring rockfish refugia on the west coast of North America.

The workshop brought together thirty-seven biologists, ecologists, social scientists, economists, and resource managers, representing federal and state agencies from Alaska to California, as well as academic interests from relevant institutes. Refugia design (including closure-time, location, size, number, shapes and boundaries of protected areas), requirements of relevant stakeholders (including fish and fishermen), and costs/benefits/risk assessment were amongst the relevant topics considered. Critical elements that influence the extent and success of closed areas were identified.

The workshop agenda included fourteen plenary papers, which provided the foundation for discussions by three working groups on Management, Design, and Socio-economic issues related to marine protected areas. Fisheries scientists (S. Ralston, NMFS; B. Leaman, International Pacific Halibut Commission) presented information on the status of rockfish stocks and current management practices; ecologists and biologists described key elements of refugia design, both from conceptual models (M. Mangel, University of California Santa Cruz; J. Sladek Nowlis, NMFS) and practical experience (J. Bohnsack, NMFS; M. Carr, University of California Santa Cruz); a marine policy analyst (D. Suman, University of Miami) addressed the process of establishing refugia; and a representative from NMFS's division of law enforcement (E. Proulx) focused on compliance issues associated with closed areas. The plenary session also included several case histories of closed areas.

There was general consensus that marine harvest refugia exemplify a precautionary approach to the management and conservation of rockfish resources on the west coast. It was recognized that, while there are limits to our scientific knowledge of rockfish ecology, we have sufficient understanding of the problems associated with their management and conservation to proceed with the process of implementing refugia as a supplement to traditional management practices. Marine harvest refugia are one of the few constructive ways to address protection and conservation of essential fish habitat, and offer the opportunity for habitat to recover from disturbances including impacts from fishing gear. Refugia hold promise in allowing us to separate environmental variables from fishery effects, incorporate ecosystem principles into fisheries assemblage management, and collect the needed baseline data for more accurate stock assessments.

Three different scenarios for developing rockfish harvest refugia were proposed, based on the goals and objectives for establishing the refugia. These scenarios range from small no-take heritage sites used for research and to protect key habitats and species, to refugia that augment other management practices and buffer against overfishing, to large harvest refugia used for sustainable fisheries management.

It was agreed that stakeholders need to be identified early in the process of implementing rockfish refugia. A network amongst all those involved in the refugia process should consider interstate and international issues of rockfish resource management. Public education should reinforce compliance and help lessen the need for enforcement, but enforcement will be necessary and should be considered in the design and implementation process. Assignment of property rights, which would encourage fishermen to take a personal interest in the protection of the refuge, would foster compliance. Vessel-tracking-systems, an attractive aid to enforcement, need to be considered. Planning should carefully consider the range of needs and concerns, resources available, and opportunities for cooperation amongst local, state, and federal entities in promoting compliance and carrying out enforcement.

The Workshop Executive Summary, Final Reports of the Three Working Groups, Agenda and List of Participants are now available on the Internet at www.pfeg.noaa.gov (look under 'What's New At PFEL'). The proceedings of the workshop (full papers on plenary presentations, conclusions and recommendations from the working groups, related abstracts) will be available as a NOAA Technical Memorandum in Summer 1998. This document will serve to direct future research and managerial decisions regarding protection and conservation of rockfish resources, as well as to make specific recommendations on design attributes of refugia. While this workshop focused on west coast resources, the conclusions and recommendations will find application to harvest refugia, biodiversity, and habitat programmes world-wide.

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## The Ecosystem Approach under the Convention on Biological Diversity

*A workshop which was held in Lilongwe, Malawi, during 26–28 January 1998*

The Conference of the Parties to the Convention on Biological Diversity adopted an ecosystem approach for the implementation of the objectives of the Convention. This was endorsed by the General Assembly of the United Nations in its Special Session in June 1997. As the development of such an approach is still in its infancy, there

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is a need for discussion about the meaning of an 'ecosystem approach' for implementation of the objectives of the Convention.

In order to further that discussion, the Governments of the Netherlands and Malawi co-hosted the workshop.

The experts discussed the following questions:

1. What do you think should be an ecosystem approach?
2. Why should we take an ecosystem approach?
3. What are the principles of an ecosystem approach?

The participants of the workshop developed 12 principles that form the ecosystem approach. Those principles are reproduced below. The participants of the Workshop conclude that these 12 principles provide a good basis for discussion and suggest them to the CBD community (Parties, international organizations, non-governmental organizations, representatives of local and indigenous communities and non-parties) and the scientific community at large for further discussion and elaboration. The principles will have to be taken from a conceptual realm and made operational. Furthermore there are many dilemmas involved in the establishment of management objectives between stakeholders within an area, between local communities and central authorities, between a managed area and areas outside and so on. Procedures and methodologies for arriving at balanced trade-offs are necessary.

What are the principles of an ecosystem approach?

As they are all complementary and interlinked, the principles below need to be read in conjunction with each other. Together they characterize the ecosystem approach. All involved in implementing the ecosystem approach should remain accountable to their constituencies for the consequences of management actions. The ecosystem approach should include a system of accountability that addresses performance of managers and decisionmakers, and achievement of management objectives. Management actions should strive for efficiency, effectiveness and equity. They should be taken with precaution.

1. Management objectives are a matter of societal choice.

Rationale: Different sectors of society view ecosystems in terms of their own economic, cultural and social needs. Ultimately, all ecosystems are managed for the benefit of humans – whether that benefit is consumptive or non-consumptive.

2. Management should be decentralized to the lowest appropriate level.

Rationale: Decentralized systems can lead to greater efficiency, effectiveness and equity. The closer the management is to the ecosystem, the greater is the responsibility, accountability, participation, and use of local knowledge.

3. Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.

Rationale: Management interventions in ecosystems often have unknown or unpredictable effects on other ecosystems and therefore need careful consideration and analysis. This may require institutions for decisionmaking, which will lead to appropriate compromises and trade-offs.

4. Recognizing potential gains from management there is a need to understand the ecosystem in an economic context. Any ecosystem management programme should:

(a) reduce those market distortions that adversely affect biological diversity;

(b) align incentives to promote sustainable use;

(c) internalize costs and benefits in the given ecosystem to the extent feasible.

Rationale:

(1) The greatest threat to biological diversity lies in its replacement by alternate systems of land-use. This often arises through market distortions which undervalue natural systems and populations and provide perverse incentives and subsidies to favour the conversion of land to less diverse systems.

(2) Often those who benefit from conservation do not pay the costs associated with conservation and, similarly, those who generate environmental costs (e.g. pollution) escape responsibility. Alignment of incentives allows those who control the resource to benefit and ensures that those who generate environmental costs will pay.

5. A key feature of the ecosystem approach includes conservation of ecosystem structure and functioning.

Rationale: Ecosystem functioning and resilience depends on a dynamic relationship within species, amongst species and between species and their abiotic environment as well as physical and chemical interactions within the environment. The conservation of these interactions and processes is of greater significance for the long-term maintenance of biological diversity than simple protection of species.

6. Ecosystems must be managed within the limits to their functioning.

Rationale: In considering the likelihood or ease of attaining the management objectives, attention must be given to the environmental conditions which limit natural productivity, ecosystem structure and functioning. The limits to ecosystem functioning may be affected to different degrees by temporary, unpredictable or artificially maintained conditions and, accordingly, management should be appropriately cautious.

7. The ecosystem approach should be undertaken at the appropriate scale.

Rationale: The approach should be bounded by spatial and temporal scales that are appropriate to the objectives. Boundaries for management will be defined operationally by users, managers and scientists. The ecosystem approach is based upon the hierarchical nature of biological diversity characterized by the interaction and integration of genes, species and ecosystems.

8. Recognizing the varying temporal scales and lag effects which characterize ecosystem processes, objectives for ecosystem management should be set for the long term.

Rationale: Ecosystem processes are characterized by varying temporal scales and lag effects. This inherently conflicts with the tendency of humans to favour short-term gains and immediate benefits over future ones.

9. Management must recognize that change is inevitable.

Rationale: Apart from their inherent dynamics of change, ecosystems are beset by a complex of uncertainties and potential 'surprises' in the human, biological and environmental realms. The ecosystem approach must utilize adaptive management in order to anticipate and cater for such changes and events and should be cautious in making any decision which may foreclose options.

10. The ecosystem approach should seek the appropriate balance between conservation and use of biological diversity.

Rationale: There has been a tendency in the past to manage components of biological diversity either as protected or non-protected. There is a need for a shift to more flexible situations where conservation and use is seen in context and the full range of measures are applied in a continuum from strictly protected to human-made ecosystems.

11. The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.

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Rationale: Information from all sources is critical to arriving at effective ecosystem management strategies.
12. The ecosystem approach should involve all relevant sectors of society and scientific disciplines.
Rationale: Most problems of biological diversity management are complex with many interactions, side-effects and implications, and therefore should involve the necessary expertise and stakeholders at the local, national, regional and international level, as appropriate.

The full report was made available as Information Document No. 9 (UNEP/CBD/COP/4/Inf.9) at the 4th Conference of the Parties to the CBD held in Bratislava, Slovakia, during 4–15 May 1998. The full report can be downloaded from the Internet at <http://www.biodiv.org/cop4/cop4docs.html>.

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## Organization of African Unity: Scientific, Technical and Research Commission (OAU/STRC), on Community Rights and on Access to Biological Resources

*Held in Addis Ababa during 21–23 March 1998*

The meeting was chaired by Prof. Johnson Ekpere, the Executive Secretary of the OAU/STRC. The 23 people in the task force were selected for their involvement in an OAU sponsored meeting held in April 1997 in Nairobi, Kenya, and for developing similar legislation for the Ethiopian government.

Financial support for the meeting was obtained from Trocaire, Ireland, and the Embassy of the Royal Netherlands Government in Ethiopia. The logistics for the meeting were handled by the Environmental Protection Authority of Ethiopia while reporting was done by the Institute for Sustainable Development, a local NGO in Ethiopia. A short report of the meeting has been prepared which summarizes the main points from the discussions.

The draft model legislation and African Convention have now been tabled as an agenda item for the OAU Ministerial Meeting which will be held in June 1998 in Ougadougou, Burkino Faso.

### *Declaration by the OAU/STRC task force on Community Rights and Access to Biological Resources*

The objective of the meeting was to develop a draft model legislation on community rights and on access to biological resources, to ensure the continuing control by local communities of their natural resources, knowledge and technologies, as well as to develop a draft African Convention on the same.

After national review and discussions, the model legislation would be expected to form the basis for African nations to develop national legislation on community rights and on access to biological resources, community knowledge and technologies, and an African convention would create coherence amongst the national legislations.

Natural resources and indigenous knowledge and technologies are a legacy humanity owes to local communities. The task force understands a local community as a section of society in a given area whose means of livelihood are based on the natural resources, knowledge and technologies of and related to its immediate ecosystems. The local community keeps adapting, generating and regenerating those natural resources, knowledge and technologies as its preceding generations had done and, if spared disruption by external forces, as its succeeding generations will do.

The essential role of the community in the conservation of biological diversity, on which the very survival of planet Earth is dependent, is recognized by the Convention on Biological Diversity (CBD). A large part of humanity represented by 150 States created the CBD in 1992.

A smaller part of humanity, represented by 40 States, concluded the negotiations for the creation of the World Trade Organization (WTO) in 1994. African countries had negligible or no inputs into the negotiations. The objectives of WTO are global and concern the movement of goods and services throughout the world for the ease of corporate global trade.

These two bodies, CBD and WTO, are therefore global, all pervading and pose very serious threats to the economies and ecosystems of Africa.

The Convention on Biological Diversity recognizes the essential role of communities in the creation, maintenance and sustainable utilization of biodiversity, knowledge and technologies for the survival of life. On the other hand, WTO promotes the privatization of resources, knowledge and technologies to the detriment of the State and its citizens. WTO imposes IPRs (intellectual property rights) modelled on the protection of industrial innovations to grant individual monopolies on living things and categorically denies the existence of community collective innovations.

It is the conviction of the task force that the WTO-based approach is predatory in nature and runs counter to the aspirations of communities which are in the first place the innovators of biodiversity so necessary for the survival of the planet.

The task force believes that the privatization of life forms through any intellectual property rights (IPR) regime violates the basic right to life and runs counter to the African sense of respect for life.

The task force therefore strongly recommends that OAU/African Economic Community member states urgently make legislation to regulate access to biological resources, knowledge and technologies so that such access shall be allowed only with the prior informed consent of the local communities and the State and shall benefit them, and to recognize community rights in order to protect the heritage of the people of Africa.

The task force commits itself to the achievement of the noble objectives of this proposed legislation and this draft Convention on Community Rights and on Access to Biological Resources.

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## International Symposium on 'Parks for Peace' of the World Conservation Union (IUCN)

*Held in Bormio, Italy, during 17–21 May 1998*

Pairs of protected natural areas divided by an international border provide an opportunity for the contiguous States to collaborate for mutual benefit in the management of those border-straddling ecological units. Such collaboration is being increasingly recognized as a useful contribution to preventing cross-border armed conflict as well as to the building of political confidence and security across that border. Indeed, the subject of transfrontier protected natural areas had already been explored in its various theoretical and practical ramifications at an international conference held in South Africa in 1997 (Westing 1998).

The purpose of this Symposium, which brought together 18 participants from nine countries and two United Nations agencies, was to follow up on the recommendations of that prior conference. More specifically, the Symposium being described here set out to produce three coordinated reports relevant to transfrontier protected natural areas: (a) a conceptual basis for them; (b) a relevant code of conduct; and (c) a set of appropriate operational guidelines. This task was, in fact, accomplished; and, once reviewed and edited, the result is to be published and disseminated by IUCN. It is to be made available especially to pairs of contiguous States, either to use as is or else to modify to conform to their particular needs. The Symposium effort gained immensely from the varied backgrounds and types of expertise which had been brought to it by the participants, including not only protected-area management in general and for border zones in particular, but also relevant forestry, zoology, biodiversity conservation, security matters, refugee assistance, diplomacy, law, and development aid.

The real strength of the Symposium output is in the particular attention which has been paid to the sensitivities associated with border regions, to issues of transfrontier collaboration, and to protected-area management not only in times of peace, but also during all types and intensities of armed conflict or the threat of such complex emergency situations.

The Symposium was graciously hosted by the Italian Ministry of Foreign Affairs together with the Italian National Park Service at Stelvio National Park, a border park, it must be noted, that has established a working relationship with its abutting cross-border Suisse National Park.

## Reference

Westing, A.H. (1998) International conference on transboundary protected areas as a vehicle for international cooperation. *Environmental Conservation* 25(3): 78–9.

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## First International Conference on Addressing Environmental Consequences of War: Legal, Economic, and Scientific Perspectives

*of the Environmental Law Institute (in conjunction with the Smithsonian Institution and the Kuwait Foundation for the Advancement of Sciences), held in Washington, DC, USA, during 10–12 June 1998*

Regrettably, warfare remains a routine human activity. Warfare is by its very nature deadly and destructive, and thus often also environmentally disruptive, the last-noted impact usually unintentional (collateral). However, in concert with the continuing deterioration of the global environment, there has been developing an accelerating concern for the environment within both the civil and military sectors of society.

The methods and means of warfare, although deadly, destructive, and often disruptive, are in practice not unlimited. As paradoxical as it may seem to some, there is a long history of humanitarian constraints associated with warfare. Especially during this century, those cultural norms have been codified into more or less widely adopted legal norms, the so-called law of war (or international humanitarian law). Moreover, those legal norms have even been extended during the past two decades to specifically embrace environmental concerns.

The present Conference brought together some 160 diverse experts from more than a dozen countries in order to examine in detail various key aspects of the existing constraints on environmental disruption by warfare. Amongst the relevant subject areas addressed were: the adequacy of the existing legal constraints on international and non-international wartime environmental disruption (this a hotly debated matter); how best the existing constraints should be disseminated within the global military sector; approaches to preventing or reducing wartime environmental disruption; following its occurrence, how the extent of wartime environmental disruption might best be assessed from economic, ecological and public health standpoints; and the adequacy of legal redress or other remedies with reference to both state and individual responsibility and liability (an area that is only now coming into its own, in part owing to recent landmark actions by the United Nations Security Council).

The Conference was greatly enriched by the diversity of specialities present, which included an array of academic scholars (ecological, economic, political, legal, medical and so on), military officers (army, naval and so on), lawyers of all stripes, epidemiologists and other physicians, and a goodly sprinkling of diplomats. Also represented were several United Nations and other intergovernmental agencies and tribunals; as well as the International Committee of the Red Cross, Green Cross International, the World Conservation Union and various further non-governmental organizations. Matters were approached both theoretically and empirically, the latter especially via analysis of the environmental impacts of the Second Indochina War of 1961–1975, the Persian Gulf War of 1991 and the Colombian Civil War of 1986–.

This Conference was not meant to culminate in any formal resolution or other consensus document. Nonetheless, it seems clear that many of the participants felt that there remains a need to refine means of damage assessment as well as approaches to establishing responsibility and legal redress. Moreover, a few random observations voiced by some of the more prominent participants might not be amiss. Mostafa Tolba (former Executive Director of the United Nations Environment Programme) pointed out that preven-

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tion of environmental disruption is more efficient than restoration, that Governments respond to public pressures on environmental reform (including those from the ever more prominent non-governmental organizations), and that widespread environmental education and dissemination are of high priority. Sherri Goodman (in charge of Environmental Security within the United States Department of Defence) informed the Conference participants that environmental threats are now recognized by the United States Government as being threats to national security. Mikhail Gorbachev (former President of the USSR) concerned over signs that a new cold war might be developing, emphasized the social and environmental importance of eliminating nuclear weapons and also the necessity for a human transformation from 'economic man' to 'environmental man'. And Oscar Arias (former President of Costa Rica) stressed the need for regulating the international arms trade, further stressing that for humankind to survive with dignity it must develop a new ethic for the 21st century.

The Environmental Law Institute expects to publish the Conference proceedings (likely to run to some 1000 pages) later this year. That document is certain to become a benchmark in the field. In due course, the Institute expects to organize a second, follow-up conference.

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## Resources, Equity, and Sustainability

*The 1998 Summer Faculty Institute of the Five College Programme on Peace and World Security Studies (PAWSS) of Amherst College, Hampshire College, Mount Holyoke College, Smith College, and the University of Massachusetts at Amherst, held in Amherst, Massachusetts, USA, during 9–12 June 1998*

As over the past 15 years, this annual PAWSS event brought together about 35 faculty members with some 15 distinguished guest lecturers. The 35 participating faculty members professed international relations, political science, sociology and related fields; and they came mainly from small colleges throughout the USA, but also a few from Canada, and this time two also from Japan. The participants were, as usual, exposed to an intense series of lectures, panel discussions and workshops led by the guest lecturers.

This year the programme was designed by PAWSS primarily to explore relationships amongst natural resource control, North–South equity, environmental sustainability and global security. Included amongst the topics analysed in depth to this end were economic growth and resource competition, social consequences of globalization, connections between environment and security, conflict and cooperation in international river basins, the militarization of natural resource disputes, water resources and international conflict, the growing importance of non-governmental organizations within the civil sector, and international governance regimes for the environment.

These annual PAWSS Summer Faculty Institutes provide a most valuable service to North American academia not least because of their growing emphasis on the connections amongst peace, security and environment. The scholarly synergisms that develop amongst the faculty participants themselves and with the guest lecturers are certain to produce a most useful multiplier effect when those faculty participants return to their respective classrooms throughout the continent.

Those interested in obtaining information on comparable future events, should contact the Director, PAWSS, Hampshire College, Amherst, MA 01002, USA (e-mail: pawss@hampshire.edu).

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## The African Sahel: 25 Years After the Great Drought – Assessing Progress, Setting a New Agenda

*Held at the Royal Geographical Society in London, during 13–14 May 1998*

It is now 25 years since the major droughts of the 1970s struck the Sahel region of West Africa. Their impacts were not uniform, for the region has a great diversity of soils, climates, livelihood systems and ethnic groups. For many, these droughts are an especially grim historical marker, given their disturbing effects on food supply and human welfare in a semi-arid region so dependent on rainfall. They also marked the beginning of profound post-colonial economic and political reforms, as well as widespread international development assistance to the Sahelian nation states.

This conference initiated reflection and assessment of the last quarter of a century in the Sahel. It was sponsored by the British Department for International Development, and the Drylands programme of the International Institute for Environment and Development. The organizers were Dr Simon Batterbury (Brunel University, Bristol, UK) and Prof. Andrew Warren (University College London, UK).

Dr Gaussaou Traoré (Institut du Sahel, Bamako, Mali) opened the conference with an assessment of the changes experienced in the nine countries that comprise CILSS (the Permanent Interstate Committee for the Fight against Drought in Sahelian Countries). He showed how the first responses to the image of a 'dying Sahel' and its food deficits of the 1970s were focused on modernizing food production and distribution systems. There was a 'a lot of aid, but a lot of aid mismanaged' because it was technically inappropriate, or poorly used.

In contrast, development thinking now revolved round carefully measured economic reforms, respect for cultural tradition and ethnic pluralism, obtaining value from better targeted aid, and support to local institutions (as in political decentralization programmes). The key challenges for policymakers today included poverty alleviation, particularly in the growing urban centres; methods for sustained conflict alleviation for land, water, and other resources; realistic rather than draconian population policies, and coming to terms with aggressive global markets that continue to disadvantage Sahelian products. Traoré outlined the 'Sahel 21' initiative, coordi-

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nated by CILSS, which was a re-visioning of development priorities for the next century. The aim was to create a federated system with a 'common market', shared agricultural policies, and a Sahelian passport. Sadly, Nigeria is still missing from these initiatives.

Claude Raynaut (Centre National de la Recherche Scientifique, Bordeaux, France) drew on his 25 years of research in Niger to stress that the diversity of the Sahelian landscape, and the global factors that affect it, should not be simplified or tackled with broad-brush policies. The social actors of the Sahel were its people, who were not 'passive toys' of structural constraints. Gross generalizations about 'overpopulation' driven by environmental overuse were simply inaccurate and misleading. Raynaut saw the Sahelian 'crisis' as both the manifestation and the cause of profound social changes. Much could be gained from promoting an 'enabling environment' to support these local responses. This will require negotiation; recognition of diversity; and a role for the state.

Mike Hulme (University of East Anglia, UK) described the Sahelian climate as 'perhaps the most dramatic example of climatic variability that we have quantitatively measured anywhere in the world'. Scientific understanding appeared depressingly deficient in the Sahel region. He showed how scientists in Africa and the West had persistently misunderstood the evolving climatic situation and had failed to predict the extent of the drought years, variously overestimating or minimizing the extent of the 'crisis'. He suggested that natural climatic variability, coupled with the known effects of changes of land cover and land-uses, explained more variation than global climatic change effects. The need was for a) better science and b) building complex adaptive mechanisms for complex systems.

Rob Groot (Wageningen Agricultural University, Holland), presenting a joint paper by himself, Henk Breman and Herman van Keulen (both of Wageningen Agricultural University, Holland), explored the significant 'resource limitations' acting in Sahelian farming. They argued that the gap between aggregate food production and aggregate population growth had grown since the 1970s, and variability in rainfall, between and within the short cropping season, posed the greatest problem. Some 40% of income from farming in the region resulted from the 'mining' of soil nutrients, as farmers have been forced to farm extensively on less suitable soils, and then to intensify production with reduced fallows. Groot and his colleagues felt that the rapid pace of resource depletion in the Sahel had left coping systems unable to respond quickly enough. Soil fertility decline was an invisible 'time bomb' for Sahelian agriculture. Subsistence agricultural systems would require, at the very least, localized low-grade applications of inorganic fertilizer to sustain productive potential.

Mike Mortimore (Dept of Geography, Cambridge University, UK) disagreed. He was based in northern Nigeria at the time of the 1970s droughts and at the time, coping strategies like migration, asset sales, and off-farm income generation were rational and widely used responses. International relief efforts, based on a too-cautious assessment, provided patchy and sometimes inappropriate support. Yet, today, usually without that support, 'Sahelian farmers are still in business' and there were ample signs of recovery, adaptation, and innovation. His work in Northern Nigeria had identified a wide range of coping strategies. Indigenous technical change has been adequate to meet the new challenges, even in areas of high population densities. Farming systems commonly transform over time from an agricultural base, to include animals, off-farm income sources and marketing, and then economic migration. Mortimore believed that the 1970s and 1980s droughts had reversible effects, because Sahelian ecosystems and economies were variable and had developed their own adaptations to that variability.

Brigitte Thébaud (private consultant, Denmark) saw the situation of pastoralists as precarious. Pastoralism was the dominant productive activity in the 'northern' Sahel and Saharan fringe where mobility was vital to maintain access to water and fodder, and conflict over resources is growing. Thébaud saw forces other than drought as contributing to conflict. Borehole projects, and early technical interventions, had disallowed customary forms of negotiation over access. Accusations of degradation had circulated in governing circles and had blocked understanding of the importance of herd mobility and thus freedom of movement across patchy landscapes. It is essential that the ongoing discussion about land tenure rules and laws in the Sahel recognizes the dynamism of common property regimes based on mobility.

Jean Marie Cour (Organization for Economic Cooperation and Development, Club du Sahel, Paris, France, and the coordinator of the WALPTS [West Africa long term perspective] study) wanted to provide a challenge to doom-laden predictions of economic and environmental crisis. For him, it was vital to see the Sahel in its regional context; as part of the West African economy, increasingly linked to the global economic marketplace. Cour reminded us that it was cities, not rural areas, that were absorbing the largest percentage of West Africa's population growth at present, because of jobs, opportunities and markets. Some 40% of the region's inhabitants already lived away from the birthplaces of their parents. Migration was a solution to land degradation, as well as a reaction to it. Cour talked of a 'silent Sahelian agricultural revolution' of increased cash crop production, particularly for specialized markets near to urban centres. That said, his optimism was directed to the accessible and richer environments in the region as loci for sustained growth.

The meeting provided realistic assessments of the challenges facing Sahelian peoples in the 21st century. Economic pessimism may be justified, but the adaptability of Sahelian ecosystems and peoples was affirmed. Papers from the meeting will appear in the journal *Global Environmental Change* and the detailed proceedings on a website (Batterbury, S. (1998)) URL http://www.brunel.ac.uk/depts/geo.html

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