‘Biodiversity of Inland Waters’ Workshop

A preparatory workshop for the 8th Global Biodiversity Forum (GBF-8) and 3rd meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA3)

Organised by
The IUCN Commission on Ecosystem Management (CEM)
The Ramsar Bureau and
Wetlands International

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Introduction

The biodiversity and therefore integrity of inland water systems are increasingly threatened by human activity world wide. To counteract this trend, the Convention on Biological Diversity (CBD) passed Decisions III/13 and III/21, which decree that CBD will work on inland water ecosystems up to and beyond its 4th Convention of Parties (COP-4), and that the Ramsar Convention on Wetlands shall be a lead partner for CBD in the implementation of CBD activities related to wetlands. To assist in these decisions, a CBD scientific paper, and various other initiatives have been produced. In response to the need to co-ordinate these initiatives, the IUCN Commission on Ecosystem Management (CEM) initiated this workshop, in close collaboration with the Ramsar Bureau and Wetlands International, in preparation for the Inland Water Systems and Biodiversity Workshop at GBF-8. The CEM produced a detailed technical review of the following documents:

- *Biological Diversity of Inland Waters* (30 June 1997) by the CBD Executive Secretary for SBSTTA
- *IUCN Brief - Inland Water Ecosystems draft document* developed by IUCN jointly with WWF-International
- *A Comprehensive Assessment of the Freshwater Resources of the World* written by the Stockholm Environment Institute for the UN
- *Global Freshwater Biodiversity: Striving for the integrity of freshwater ecosystems Working Draft 1997* by McAllister D. E. et al for Strategy for International Fisheries Research, International Development Research Centre, Canada
- *Freshwater Biodiversity* Discussion paper prepared by the WCMC for the CBD Secretariat
- *"Wetlands and biological diversity*" which was distributed at CBD COP3 (as Information Document 41) drawn up by the Ramsar Bureau, with much help from WWF.
- *Ramsar Strategic Plan 1997-2002*

which facilitated discussions at the workshop, and led to the production of the 'areas to develop' analysis and contributed to the Proposed recommendations for submission by SBSTTA to COP4.

The workshop was a preparatory phase of the CEM initiative '*The Biodiversity of Inland Water Systems: trends and options for improved conservation and management*'. The success of the workshop is a reflection of the strength of the partnership between the lead partners of this project: CEM, The Ramsar Bureau, and Wetlands International, and of the role of the other project partners, some of whom were unable to attend the preparatory workshop but will give their input to the workshop products before and during GBF8. These include: Diversitas, The International Geosphere-Biosphere Programme (IGBP); the Scientific Committee on Problems of the Environment (SCOPE); the IUCN Species Survival Commission (SSC); the World Conservation Monitoring Centre (WCMC); the World Resources Institute (WRI); the World Wide Fund for Nature (WWF) and The World Bank.

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Objectives of Workshop

General

- To bring together scientific and technical organisations working on biodiversity of inland water ecosystems, with a view to co-ordinating and strengthening their input to the forthcoming GBF8 and SBSTTA meetings, and in the longer term to implementation of the CBD and the Ramsar Convention

Specific

- To discuss a technical review of the CBD Secretariat paper and other initiatives put forward to maintain the integrity of inland water ecosystems and their biodiversity and to produce:
    - a provisional list of recommendations concerning the workplan to be submitted to SBSTTA3 for recommendation to the COP4.
    - Priority recommendations for discussion at the GBF-8 Workshop 'The Inland Water Systems[1] and Biodiversity', 28-31 August 1997, Montreal.
    - an 'areas to develop analysis' of the CBD paper, which would supplement, and suggest amendments to, the CBD paper.

- In view of the above, discuss the agenda for the GBF-8 Workshop

Outputs of Workshop

- a provisional list of recommendations concerning the workplan to be submitted to SBSTTA3 for recommendation to the COP4
- a draft agenda for the GBF-8 workshop 'The Inland Water Systems and Biodiversity', 28-31 August 1997, Montreal (to be circulated separately)
- an 'areas to develop analysis' of the CBD paper, which supplements and suggests amendments to, the CBD paper

The outputs of the workshop are available for general circulation to all interested parties. Comments received by 21 August [2] will be presented together with this report for further discussion at GBF-8 and the final product delivered to SBSTTA3 and integrated to the final products presented to COP4.

[1] For the purposes of this paper, system and ecosystem are synonymous
[2] To CEM Secretariat, attention Dr L. Safford

Proposed recommendations for submission by SBSTTA to COP4

Introductory Rationale

The flow of inland waters from mountains or lowlands to the sea, and from continental drainage basins to land-locked depressions, is an essential part of the globe's hydrological cycle. It links atmosphere, biosphere and hydrosphere; surface and groundwaters; fresh and saline waters and a wide range of ecosystem types.

The apparently inexhaustible supply of freshwater stimulates a wide variety of human activities which have now come increasingly into conflict with one another and with the needs of other species. Degradation of water quality and reduction in water quantity available from surface and groundwater resources clearly show that inland waters are not inexhaustible resources. The well being of both people and ecosystems depending on these resources is severely endangered. The sustainable and wise use of inland waters and their biodiversity has become a matter of general and great concern underlined by the priority identified by the CBD.

Inland waters include a rich variety of ecosystems, many of which are physically and biologically connected by the flow of water and the movement of species. The biodiversity of individual ecosystems is maintained by physical, chemical and biological interactions more or less controlled by hydrology. These connections are of paramount importance for the maintenance of biodiversity and the welfare of human communities; they are significant over a wide range of scales; local, regional, national and global. The ecosystem-based approach recognises the overriding importance of the dynamic interactions among biotic and abiotic elements and the significance of adapting a sufficiently large scale of management intervention to influence those activities or processes which control ecosystem structure and functioning. The most common scale at which the ecosystem-based approach can be implemented for sustainable resource use is that of the catchment. This enables consideration of all the links and impacts which may occur over a range of ecosystem types connected by water flow. It is important to remember, however, that catchments for groundwaters and surface waters may not be the same.

The hidden value of inland water ecosystems
The value of the biodiversity of inland waters, as a resource for human populations, is well appreciated. However, the value of the functions and services they provide, (which maintain biodiversity and contribute to human welfare) are often 'hidden' and consequently less well appreciated. Biodiversity cannot be sustainably managed in isolation from the functions and services of ecosystems; components of biodiversity maintain these functions and services.

Inland water ecosystems provide food, water, and fuel, and in addition perform important hydrological services, such as control of floods, cleaning water, recycling waste products and regulation of local and global climates. The value of these services are often only appreciated when they are lost. The most accurate economic assessment of the impacts of different management regimes on inland water ecosystems are those which take into account the economic and social value of these functions, services and biodiversity of inland water ecosystems.

The inter-relationship of biodiversity and ecosystem maintenance
Inland water ecosystems with impoverished biodiversity may lack the ability to adjust to environmental impacts or changes. Thus biodiversity is important to an ecosystem's:

- ability to maintain its regenerative abilities in spite of external interference/stress;
- capacity for developmental options; and
- ability to develop naturally, unconstrained by human activities.

An additional requirement for maintaining inland water ecosystems is that the quantity and quality of water in the ecosystem is sufficient to maintain ecosystem functioning.

Other overarching themes:

- the need to include indigenous and traditional knowledge of local communities in management planning
- the need for capacity building
- restored/rehabilitated/created inland water ecosystems cannot replace natural ecosystems

Recommended programme of work 1998-2002

It is proposed that SBSSTA3 recommend to COP4 the following:

Initiation of a four year programme of work on the biodiversity of inland water ecosystems, aiming to promote the maintenance and sustainable use and management of the functions and services provided by inland water ecosystems for the benefit of human welfare and biodiversity. The specific roles of biodiversity at different scales should be identified. Inland water ecosystems provide links to and between other ecosystems, communities, and countries. Therefore, the work plan must ensure that;

- strong links are built between the CBD and other conventions, especially the Ramsar Convention, to foster a future multi-convention work programme;
- co-operation, monitoring of status and trends, management and resolution of conflicts over the resources of inland water ecosystems resources, take place at ecosystem (ie. catchment) level;
- the importance of the functions and services of wetland ecosystems to human welfare throughout the catchment area and beyond, and the contribution biodiversity makes to these functions and services are recognised;
- the significance of groundwater as well as surface waters is acknowledged.

Specifically, the work plan may encompass the following recommendations under the following articles of the Convention on Biological Diversity (Bold type indicates priority).

Article 5 - Co-operation

- **encourage co-operation at the ecosystem level, (normally at catchment scale, including areas where inland water ecosystems cross national frontiers) in projects to:**
  a) promote the biodiversity of inland water ecosystems,
  b) ensure that an adequate quantity and quality of water is available to ensure ecosystem functioning.
  Appropriate regional bodies or partnerships such as River or Lake Commissions should be encouraged to incorporate measures to promote biodiversity and maintenance of ecosystem functioning of inland water ecosystems into their work programmes.
- promote regional agreements and other appropriate mechanisms to conserve migratory species in inland water ecosystems e.g. under the Convention on Migratory Species of wild animals (Bonn Convention).

Article 6 - General Measures for Conservation and Sustainable use

- **emphasise biodiversity of inland water ecosystems in National Biodiversity Strategies and/or Ramsar National Wetland Policies,**
- **fully integrate measures to maintain biodiversity (including concern for quality and quantity of water) into National Water Policies,**
- **measures for conservation and sustainable use should adopt an ecosystem-based approach**.

Article 7 - Identification and Monitoring

- promote:
  a) the harmonisation and adaptation of existing methods, e.g. Ramsar, (and where necessary, development of new methods) for inventory and monitoring the biodiversity of inland water ecosystems at different scales and for different regions, and
  b) the development of necessary tools to recognise the negative impacts on the functioning and services of inland water systems

- promote the further development of the use of indicator species and species complexes as a way to monitor and evaluate ecosystem functioning and health

- **recognise the need to inventory and monitor the functions of inland water ecosystems, and the services they provide, which contribute to the maintenance of biodiversity and human welfare. Develop classification systems for inland water ecosystems based on the functions and services they provide.**

- recognise and evaluate the impact of non-point source pollutants on inland water ecosystem biodiversity and functioning, and human welfare.
- encourage the use of existing inventories and documentation to draw up a general overview of the status and trends of the biodiversity of inland water ecosystems (c.f. Ramsar Strategic Plan 1997-2002) and to identify gaps in knowledge.
- encourage development of scientific methodologies to identify biogeographically important areas of inland water ecosystems (e.g. areas that act as temporary refuges for migratory species, or areas that each support sub populations of a population) at different scales to establish priorities as an aid to decision makers.

Article 8 - *In-Situ* Conservation

- shift the focus of efforts to conserve biodiversity in inland water ecosystems from conserving species and habitats alone to maintaining ecosystem functioning. For this purpose integrated catchment management is essential: a traditional protected area approach is inadequate. Hence management plans for the conservation of biodiversity in inland water ecosystems need to extend over, and take account of the conditions in, the whole catchment area (cf. Ramsar management planning guidelines). In many cases this will require trans-frontier co-operation.
- develop guidelines for the application of an ecosystem-based approach for the management of inland waters for biodiversity.
- recognise that restored, rehabilitated or created inland water ecosystems cannot replace naturally functioning ecosystems. Restoration, rehabilitation and created mechanisms are of limited value and often expensive compared to the maintenance of existing natural sites, but may be important in keeping some small transient types of inland water ecosystem in existence.
- recognise that the introduction of invasive alien species is one of the most important negative impacts on the biodiversity and functions of inland water ecosystems. Take measures to:
  - address such impacts at a global/international level as an integral part of a global strategy, and
  - apply this strategy at a national and local level.
- Recognise the need to ensure that the requirements of migratory species, environmentally sensitive species, and others with highly specialised niches are recognised and fully included in conservation efforts.
- Include indigenous and traditional knowledge of local communities in management planning.

Article 9 - *Ex-situ* Conservation

- recognise that the complexity of inland water ecosystems, and the high turnover rate of their component species, means that ex-situ conservation measures are generally less relevant and of lower priority in inland water ecosystems than other ecosystems, although they are of use and importance in specific cases.

Article 10 - Sustainable Use of Components of Biological Diversity

The continued availability of inland water ecosystem resources is an indispensable requirement for the health and prosperity of human communities and is vital for the maintenance of biodiversity. Biodiversity is a key determinant of the structure and functioning of the ecosystem complexes which help maintain the hydrological cycle and water quality. Understanding of the interactions between the biotic and abiotic components of the ecosystem is essential for developing sustainable use models of inland water resources. Sustainable use practices should be applied at the catchment scale because at this level the hydrological cycle links the atmosphere with land and water ecosystems.

- **recognise that the sustainable use of ecosystem functions and services as well as of biological resources should be integrated into national decision making. Hence, consider the quality (including levels of pollutants) and quantity of water in inland water ecosystems.**
- **develop scientific criteria to determine the sustainability of biodiversity functions and services of inland water ecosystems.**
- **develop scientific tools to involve the entire range of stakeholders (including the private sector) in equitable cost-benefit analyses, to support sustainable use of inland water ecosystems.**
- **undertake scientific evaluation of the increasing demands for consumptive use, and establish scientific guidelines for conflict resolution .**

Article 12 - Research and Training

Research is essential to improve the level of existing knowledge and to fill gaps identified by the changing needs of society. Yet the application of science and development of better policies for inland waters should not be delayed by current imperfections in information or understanding. Training should focus on broadening the level of interdisciplinary understanding of the scientific fields underpinning the sustainable management of inland waters whilst also ensuring that the necessary specialised biological, taxonomic and ecological expertise is maintained and built upon in succeeding generations.

Current research priorities focus on four key objectives:

1. determining the role of biodiversity and key processes in the functioning of whole catchments in the perspective of global and environmental changes;
2. finding ways of scaling up from the level of functioning of individual processes and ecosystems to the dynamics of entire catchments;
3. translating the science base into effective methods, actions and protocols for the management and sustainable utilisation of inland water;
4. investigating, classifying and monitoring the species and species complexes integral to the functioning of inland water ecosystems

- encourage multi- and interdisciplinary research and institutional frameworks which facilitate application of the results.
- encourage research on the constraints of application of an ecosystem-based approach to the management of the biodiversity of inland waters.
- expand knowledge in certain regions (e.g. tropical regions), certain taxa (i.e. invertebrates, microorganisms, etc.), class of threat (e.g. threats to genetic diversity) and on nature of certain trends (e.g. large scale threats such as global or regional climate change).
- harmonise regional methodologies for recording trends. Encourage assessment of threats through an ecosystem by threats matrix.
- develop scientific guidelines for the type, significance and scope of the use of indicators at different scales of biodiversity.

Article 13 - Public Education and Awareness

- **recognise that education and awareness should focus on :**
  - **a) the principles, and application of the principles, of ecosystem management[3]**
  - **b) the essential role of hydrological relationships for maintenance of biodiversity**
  - **c) the importance of the natural functions (e.g. delivering hydrological services, like flood control) and dynamics of inland water ecosystems**
  - **d) the benefits provided by inland water ecosystems to human health and quality of life as well as to wildlife**
  - **e) how a negative impact on an inland water ecosystem, or those ecosystems linked with it, can give rise to deleterious effects in areas remote from the source, and**
  - **f) the importance of naturalness and uniqueness, as well as species richness, in the evaluation of biodiversity**
- **encourage the use of 'Best Practice Demonstration Projects' in increasing awareness of the methods and the importance of maintaining and sustainably using the biodiversity, functions and services of inland water ecosystems.**

[3] For further information of the principles of an Ecosystem-based approach to management see: M. Holdgate, E.Maltby, M.Acreman and A.Weir 'The Principles of Ecosystem Management' The first Sibthorp papers. (In Prep.)

Article 14 - Impact Assessment and Minimising Adverse Impacts

- recognise that cross-border and downstream effects are of particular concern to the biodiversity of inland water ecosystems. Specific Environmental Impact Assessment methodology and training are required. The Organisation for Economic Co-operation and Developments, "Development Assistance Committee" (OECD/DAC) guidelines[4] should be evaluated, developed further where necessary and applied.
- recognise the need for the development of emergency and contingency plans (e.g. for chemical spills)

Article 18 - Technical and Scientific Co-operation

- establish mechanisms to foster collaboration to:
    a) make better use of the resources and institutional frameworks already available, and
    b) avoid duplication of effort
- establish mechanisms for co-ordinating supra-national, international and local collaboration, for example, between water development projects, organisations and agencies, and those concerned with natural resources, species and habitat conservation
- make maximum use of existing and anticipated information systems, including those of Ramsar, IUCN (Species Survival Commission, Wetlands Programme, Commission on Ecosystem Management), Wetlands International, Biodiversity Conservation Information System Consortium, DIVERSITAS and consider mechanisms to link these with the clearing house mechanism.

[4] Guidelines on Aid and Environment No.9 Guidelines for Aid Agencies for Improved Conservation and Sustainable Use of Tropical and Sub-Tropical Wetlands.

'Areas to develop' analysis

From discussions of a technical review prepared by the IUCN CEM, a series of areas of the CBD Secretariat paper 'Biological diversity of inland waters' (Draft dated 30 June) were identified that would benefit from development. It is suggested that the following recommendations be considered as a supplement to the CBD Secretariat paper. Paras = paragraphs of the CBD paper.

Subject Area of CBD Document.	Area to develop in CBD Secretariat Document	Is knowledge available?	Recommendation
Status and Trends and Threats (paras 6-17)	Status and trends particularly on scale of loss and nature of ecosystem degradation.	Knowledge available for some regions - but information for many regions patchy or unavailable.	Expand knowledge in certain regions, and on nature of certain trends. Recognise need to harmonise regional methodologies for recording trends. Encourage assessment of threats through an ecosystem by threats matrix.
	Proximate or underlying causes of trends.	Knowledge limited.	Emphasise that paper is dealing with proximate rather than underlying causes of trends.
	Status, trends and threats to genetic diversity and ecosystem functioning and services.	Knowledge available for some threats in some regions.	Acknowledge significance of and encourage research on genetic diversity and ecosystem functioning and services.
	The necessity for conflict resolution to reduce competition for water resources, for example between aquaculture and water extraction.	Lack of guidelines for managing competing demands.	Develop guidelines for managing the competing demands for inland water resources in order to maintain and protect biodiversity
	Large scale (i.e. global) threats, for example global or regional climate change.	Lack of knowledge of consequences of these threats.	Recognise need to understand consequences of large scale threats such as climate change.
Definition of inland waters	Relationship of definitions of 'inland water ecosystems' and 'wetlands' especially in relation to estuarine ecosystems.	Yes but uncoordinated	Recognise that definitions are complicated because these ecosystems are highly variable and dynamic. The role of hydrological regimes is of key importance in controlling environmental and ecological functioning. Recognition of inland waters in the context of ecosystems enables focus (a) at different

			scales and (b) on linkages with other systems such as marine and atmospheric. Amend para 7 by deleting 'which are traditionally grouped as inland wetlands' Retain footnote No.2 Advise Ramsar to provide paper clarifying the definition of Ramsar Wetland Types with respect to types of inland water ecosystems
Categories of inland waters and biodiversity	Coverage of saline and peatland ecosystems	Available but not incorporated.	Significance of saline and peatland inland waters should be acknowledged and special needs examined.
	Coverage of species other than fish species	Relatively easily available.	Redress balance in CBD document by including reference to un-emphasised classes of biodiversity (see below).
	Coverage of biodiversity of tropical inland water ecosystems	Insufficient available.	Acknowledge significance of, and encourage research on, the biodiversity of tropical inland water ecosystems.
	Coverage of: • plants • water birds • invertebrates • species which are heavily dependent on, but do not reside permanently in, inland water, and • 'keystone' species, that is species which contribute disproportionately to the maintenance of the ecosystem.	Available, but not incorporated.	Incorporate information on these groups into paper.
	Biodiversity of different ecosystems may be of equal importance, irrespective of its relative 'richness'. Evaluation of biodiversity does not depend just on number of species. Naturalness, uniqueness and functioning are important.	Point in general not widely appreciated.	Acknowledge this point (amend para 30 of CBD paper) and encourage understanding and application of this principle.
	Meaning of 'indicator'. Need to provide information on the type, significance and scope of indicators, for use in	Further guidance is required on type, significance and scope of	Endorse para 74 (b) on possible future programme of work: indicator development.

	monitoring the status of biodiversity, functions and services of inland water ecosystems at different scales.	use of indicators at different scales of biodiversity indicators.	
Functions of inland water systems	Functions of inland water ecosystems, including their importance for control of local climate.	Adequately covered in introduction of this document.	Refer to introduction of this document. Make an information document on ecosystem functioning. available to SBSTTA. Increase awareness of essential role of hydrological relationships in maintenance of biodiversity and of role of inland water ecosystems in delivering hydrological services, e.g. flood control.
Ecosystem approach (paras 18-21)	Use of term 'ecosystem approach' rather than 'ecosystem-based approach' . Nature and implications of an ecosystem-based approach. Constraints of the application of an ecosystem-based approach to the managing the biodiversity of inland water ecosystems.	Available. Available. Not known in sufficient detail.	Recommend use of 'ecosystem-based approach' instead of 'ecosystem approach'.[5] Recommend development of guidelines for the application of an ecosystem-based approach for the management of inland waters for biodiversity (para 43.iv). Recommend and encourage research on the constraints of application of an ecosystem-based approach to the management of the biodiversity of inland water ecosystems
Biogeography of inland waters	The importance of inland water biogeography in managing the biodiversity of inland water ecosystems, for example, as temporary refuges for migratory species and for metapopulations (several inland waters ecosystems may each support a small sub-population, which together form a larger significant and interacting population of a species)	Point generally appreciated, but need for wider and more integrated knowledge of biogeography. Knowledge of rationale available.	Amend para. 30 to acknowledge this point and encourage understanding and application of this principle. Encourage development of methodologies to identify biogeographically important areas of inland water ecosystems at

[5] For further information of the principles of an Ecosystem-based approach to management see: M. Holdgate, E.Maltby, M.Acreman and A.Weir 'The Principles of Ecosystem Management' The first Sibthorp papers. (In Prep.)

			different scales, to establish priorities and aid decision makers. For example, in the design and allocation of protected area networks and bufferzones.
Sustainable resource use (paras 25, 34 -39)	Scientific criteria to determine sustainability of : 1. stocks and populations for ensuring sustainable use of biological resources of inland water ecosystems 2. biodiversity functions and services of inland water ecosystems.	Limited.	Acknowledge importance of scientific criteria and encourage their establishment.

Equitable sharing of benefits (paras 40-42)	The scientific basis for establishing Mechanisms for Co-ordination of Access to inland water and inland water ecosystem resources and benefits, including biological resources, by all stakeholders	Limited.	Recommend scientific guidelines for integrated management and equitable sharing of inland water and the resources and benefits of inland water ecosystems, including biological resources. Need to examine scientific and operational tools for promotion of equitable distribution of costs and benefits of resource use.
In situ conservation (paras 26-30) Restoration of inland water ecosystems	Role of restoration, rehabilitation and creation of inland water ecosystems.	Limited - often expensive and untested science.	Recognise that restoration means restoration of function and services not simply morphological appearance. Acknowledge that • restored, rehabilitated or created inland water ecosystems can not replace natural sites • the success of restoration, rehabilitation and/or creation of inland water ecosystems can be limited and expensive compared to the maintenance of existing natural sites, but • may be important in keeping some small transient types of inland water ecosystems (e.g. Ponds) in existence.
Protected areas	Inclusion of groundwater and endemic species in management plans for protected areas.	Available.	Recognise the need to include groundwater and endemics in management plans for protected areas.
Ex situ conservation (paras 31-33)	Evaluation of role of ex-situ conservation.	Available.	Acknowledge that Ex-situ conservation is: • generally of limited relevance and value in maintaining the natural biodiversity, functions and services of inland waters

			• but of importance in specific cases and in the development of aquaculture where it may reduce pressure on natural populations.
Legislative frameworks	Not covered because authors consider this is a matter for the COP.		Consider whether legislation of the Ramsar Convention is sufficient to cover enforcement of the CBD in relation to inland water ecosystems. - request information paper from Ramsar on this point.
Role of ongoing research	Fundamental role of science.	Role known and identified, but constraints on effective delivery of science need investigation.	Ensure the effective transmission of the best available science to assist decision makers. Transfer experiences from case studies, and among regions and different social contexts.
Co-ordination between agencies	Information on mechanisms for co-ordination.	Mechanisms for co-ordination are not in place or are not fully applied.	Encourage the establishment of mechanisms to foster collaboration to: • make better use of the resources and institutional frameworks already available and, • avoid duplication of effort. Encourage the establishment of mechanisms for co-ordinating supra national, international, national and local collaboration.