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Emerging policy issues: environment and development

Outcome of the Eye on Earth summit

Note by the Executive Director

The annex to the present notes provides the outcome statement of the Eye on Earth summit held in Abu Dhabi, United Arab Emirates, from 12 to 15 December 2011. It has been reproduced as received, without formal editing.

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Annex

Eye on Earth Summit Outcome Statement

Executive Summary

Convened under the patronage of His Highness Sheikh Khalifa Bin Zayed al Nahyan, President of the United Arab Emirates, the Summit was hosted in Abu Dhabi, UAE (December 12-15, 2011) by Environment Agency Abu Dhabi (EAD), facilitated by Abu Dhabi Environmental Data Initiate (AGEDI) in partnership with the United Nations Environment Programme (UNEP).

The Summit brought together over 1000 participants representing Governments, UN organizations and Civil Society representatives. The aim was to converge community thinking around the most pressing challenges facing the world today, opportunities presented by growing repositories of data, rapid technological advancements and an ever more connected world. The Summit also set the sage for collaborative action moving forward to harness these technologies, information and networks to better protect, secure and sustain the planet's resources and peoples.

The Summit Governance Structure was comprised of an Executive Advisory Board, Framework Committee and five Working Groups, representing all aspects of the global environmental and social information networking movement. The official Summit website, www.eyeonearthsummit.org provides further information on the Summit.

The success of Eye on Earth was such that it was announced by H.E. Razan Khalifa Al Mubarak that **Eye on Earth would reconvene in 2014 in Abu Dhabi.**

Summit outcome

The Summit had one overarching outcome in that in convened the nucleus of an 'Eye on Earth Community' which is a diverse range of stakeholders embracing Governments, UN agencies, funds and programmes and Major Groups (particularly the scientific and technical community) that have agreed to collaborate on a range of initiatives aimed at compiling and providing access to the data and information needed to monitor the state of the global environment. This sense of building a collaborative community is reflected in the *Eye on Earth Declaration* adopted by acclamation at the Summit and signed officially by UNEP, AGEDI and the UAE Government.

Institutional networking, technology support and capacity building are all part of this collaboration therefore, from UNEP's perspective, it supports the development of UNEP-Live and the implementation of the Bali Strategic Plan.

The Eye on Earth Summit featured an Exhibition opened to the Summit attendees, educational institutions and the general public. The exhibition gathered the world's leading experts of the fields of environmental, geospatial and societal data. Highlights included the Abu Dhabi Pavilion, Technology Showcase, Innovation Forum, and the One UN Pavilion to display information and products that illustrate the multi-dimensional international work the UN is doing in the area of environmental data and information.

Specific outputs of the Summit

1. Eye on Earth Declaration

To acknowledge the highest level of political endorsement and commitment to the Summit outcomes the Eye on Earth Summit Declaration was finalized at a discussion session on the 12th of December 2011 and was endorsed by acclamation at the closing plenary on Thursday 15th of December 2011.

The closed 'Rio +20 Session' for Ministerial delegations took place on Monday 12th December 2011 with a view to endorsing the Eye on Earth Summit Declaration. Attended by 16 delegations, including **United Arab Emirates, Republic of Nicaragua, Federal Republic of Brazil, European Union, Federal Republic of Nigeria, Federal Democratic Republic of Nepal, Kingdom of Norway, Republic of Kiribati, Syrian Arab Republic, Republic of Indonesia, Republic of Iraq, United States of America, Republic of the Sudan, Republic of Uganda, Republic of Chile,** it was facilitated by United Nations Environment Programme (UNEP) and Abu Dhabi Global Environmental Data Initiative (AGEDI). Comments from the **UNEP Major Groups and Civil Society Forum** held on the 11th December were presented. An open discussion with official delegations and the Civil Society followed, the outcome of which was unanimous agreement on the final text of the Eye on Earth Declaration.

Following the conclusions of the Summit, the Eye on Earth Summit Declaration was presented jointly by AGEDI and UNEP to 2nd Intersessional Meeting of UNCSD, UN/DESA Secretariat on 15 to 16 Dec 2011 in New York, USA.

The Summit Declaration will be submitted to the United Nations Conference for Sustainable Development (UNCSD) to be held in June 2012.

2. Eight approved Special Initiatives (3 cross-cutting and 5 thematic)

- Eye on Global Network of Networks
- Eye on Environmental Education
- Eye on Access for All

- Eye on Water Security
- Eye on Disaster Management
- Eye on Oceans and Blue Carbon
- Eye on Biodiversity
- Eye on Community Sustainability and Resiliency

The objective of the Special Initiatives is to improve the landscape of environmental and societal information networking for the benefit of mankind, and from which compelling, tangible results can be achieved in medium term. A total of eight Special Initiatives were presented at the Summit and endorsed at the closing plenary. They outline programmes of work that address the specific issue areas and are to be undertaken by key stakeholders over the next 2-5 years.

Furthermore the Special Initiatives endorse, adopt and demonstrate the principles of the Eye on Earth Declaration.

In her closing remarks to the Summit, HE Razan Mubarak, Director-General of the Environment Agency Abu Dhabi (EAD) announced that AGEDI would participate in three of the 'thematic' Special Initiatives and the 'foundation' initiative Eye on Network of Networks, leading local elements of the programmes, facilitating them regionally and engaging in the programmes internationally. The 'thematic' initiatives being:

- Eye on Water Security
- Eye on Biodiversity
- Eye on Oceans and Blue Carbon

From AGEDI's perspective, these four Special Initiatives will further the implementation of Phase III of AGEDI over the biennium 2012-2013. All of the special initiatives are complementary to UNEP's approved programme of work 2012-13.

3. Seven White Papers, including recommendations, from the five Working Groups

A total of five working groups were convened to support the preparatory process of the Summit. The terms of reference for each Working Group was to identify and frame the most challenging environmental data and information issues in their respective focal areas. Each working group was comprised of approximately 25 experts representing Government, the UN family and Major Groups. Every effort was made to ensure geographical, gender and sectoral representation in each Working Group. The titles of the Working Groups were as follows:

Working Group 1 - Policy, Governance and Institutional Networking

Working Groups 2 - Content and user needs

Working Group 3 - Technical Infrastructure

Working Group 4 - Capacity Building, Education and Awareness Raising

Working Group 5 - Applications Showcase

The Working Groups initially produced a set of issue papers which were used as the basic input for a set of white papers of the key issues identified in their respective focal areas. A total of seven white papers were produced along with specific recommendations for future action.

4. Statement from the Civil Society Forum which is focused on revitalizing Principle 10 of the 1992 Rio Declaration.

The Eye on Earth Civil Society Forum (CSF) on "Greater Access to Environmental and Societal Information" was held on December 11, 2011, prior the Eye on Earth Summit Abu Dhabi 2011. The Forum was attended by over 70 participants from 39 countries, who prepared recommendations to the Eye on Earth Summit. The Forum's agenda was unique in that, for the first time, all of the 9 major groups had a focused discussion on the issue of access to environmental information.

The Forum reviewed and consolidated inputs on the draft declaration of the Summit adopted on December 15, 2011, and discussed a number of themes including Policy, Governance and Institutional Networking; Content and User Needs; Technical Infrastructure; and Capacity Building, Education and Awareness Building. It also provided valuable input to the special initiative centred on Principle 10 entitled *Access for All*.

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The following four sections provide more detailed information on the Summit outputs described above.

I. Eye on Earth Summit Declaration

We the Ministers, and high-level representatives of government, business, academia and civil society (The Eye on Earth Community) present at the first Eye on Earth Summit in Abu Dhabi from 12 to 15 December 2011,

Deeply concerned over the evidence of unprecedented environmental changes at all levels, including possible irreversible changes with potentially negative implications for economic and social development, especially for the poor and vulnerable groups in society,[1]

Conscious that cooperation on exchange of, and access to, timely, credible and relevant observations and information among a wide array of actors is a critical part of the science-policy interface needed for advancing the development and implementation of goals, targets and indicators for sustainable development,

Recalling Principle 10 of the Rio Declaration on Environment and Development, which amongst others recognises that each individual shall have appropriate access to information concerning the environment that is held by public authorities, and that States shall facilitate and encourage public awareness and participation by making information widely available,

Recalling the Bali Strategic Plan for Technology Support and Capacity-building[2] and emphasising the importance of its full implementation,

Convinced that a strengthening of the capacity for managing, exchanging and facilitating access to information in developing countries and countries with economies in transition will help advance the development and implementation of goals, targets and indicators for sustainable development,

Conscious of the opportunities offered by the rapid advancement of information and communications technologies for enhancing information access, exchange and management, and the importance of promoting broader realisation of these opportunities,

Acknowledging the critical role of existing thematic and geographic networks and systems for exchange of and access to information, including the role of the Group on Earth Observations (GEO) and its land, sea, atmosphere and space-based Group on Earth Observations System of Systems (GEOSS), and also the role and activities of the Global Spatial Data Infrastructure Association (GSDI) in delivering of spatial data platform to facilitate data and service discovery, access and integration,

Bearing in mind that the United Nations Conference on Sustainable Development in Rio in 2012 represents an opportunity to renew the political commitment to the role of information in advancing sustainable development, including as it relates to consideration of the Conference themes: green economy within the context of sustainable development and poverty eradication, and institutional framework for sustainable development,

Noting the interest that has been expressed in considering the development of a global treaty based on Principle 10 of the Rio Declaration,

[1] From OP 10 UNGA Resolution 63/220 19 December 2008

[2] UNEP Governing Council Decision 23/1-I, which adopts the Bali Strategic Plan for Technology Support and Capacity-building, 25 February 2005

Expressing our deep appreciation to the Government of United Arab Emirates for organising and hosting the first Eye on Earth Summit in partnership with the United Nations Environment Programme (UNEP).

Declare that we:

1. *Aspire* to a vision whereby decision-making for sustainable development, is empowered by the availability and equitable accessibility of credible, relevant and timely information;

2. *Decide* that the objectives of our collaboration are to foster collaboration among communities, relevant networks, systems, institutions and technology providers on the integration of economic, environmental and social information in a shared information system for the advancement of sustainable development by taking advantage of the rapid development of information and communication technologies and by strengthening capacity building and technology support to developing countries and countries with economies in transition;

3. *Agree* to advance our collaboration based on the following principles:
   a. The agenda for cooperation should be flexible, balanced, purpose-driven, issue-focused, and time-bound yet durable and be developed in respect for the diverse range of stakeholders and their governance structures so as to build trust among partners;
   b. The modalities for cooperation should be inspired by the subsidiarity principle so that functions are performed in a distributed manner by those best placed to do so and information is kept close to the source in order not to lose knowledge about its use and limitations;
   c. That effective mechanisms for the collection, management and dissemination of environmental information are needed and the responsibility for quality assurance of the information lies with those who collect or originate data;
   d. Information should be made available in such a way that it avoids unnecessary duplication in data collection, underpins reporting obligations, and supports decision-making;
   e. Environmental information should be available to the public, with any exemptions being defined in law and interpreted narrowly having regard to the public interest in disclosure so that access to information is timely, effective and affordable for all interested users;

4. *Enhance* efforts on incorporating environmental information and programmes into education curriculum at all levels: primary, secondary and tertiary and developing life learning programmes for professional development, such as distance learning activities;

5. *Agree to* work with the United Nations in establishing a forum for cooperation among sub-global and thematic environmental information networks with a view to further enhancing their connectivity and effectiveness in supporting assessments, information exchange and decision-making for sustainable development;

6. *Decide* to work with the Group on Earth Observations (GEO), other relevant initiatives and interested partners in supporting the further development and expansion of the existing interoperability standards for data and information exchange, as well as a global approach to the provision of web-based platforms in support of information exchange;

7. *Resolve* to support the development of adequate institutional and legislative enabling conditions for furthering the implementation of Principle 10 of the Rio Declaration, *inter alia* based on the

Guidelines for the Development of National Legislation on Access to Information, Public Participation and Access to Justice in Environmental Matters;[3]

8. *Commit* to engage in, and to strengthen existing initiatives already involved in, technical cooperation for capacity building and technology support for access to and exchange of information in developing countries and countries with economies in transition, including by supporting development of networks, regional cooperation, data collection, research, analysis, monitoring and integrated environmental assessment and legislative and institutional frameworks for access to information;

9. *Urge* the further development of private-public partnerships for use of information and communication technologies and encourage the private sector to use their research and development capacities to enhance the implementation of national and internationally agreed goals and targets for sustainable development;

10. *Welcome* the Eye on Earth Exhibition, the Special Initiatives identified and the technical work by the Summit on policy, governance and institutional networking for information exchange; content and user needs; technical infrastructure; capacity building, education and awareness-raising, and showcasing applications;

11. Following from this, *intend* to develop further the Eye on Earth Community, supported and facilitated by the Abu Dhabi Global Environmental Data Initiative (AGEDI) and UNEP, to progress the Special Initiatives and other such projects and programmes, both existing and in the future, including the development of national capacities;

12. *Call* on UNEP and all actors in development co-operation to assist developing countries and countries in transition, when requested, through targeted capacity building programmes in their efforts to develop adequate national legislation and support for public access to information in line with the UNEP Guidelines on Principle 10;

13. *Call* on Governments, United Nations bodies, other international organisations, multilateral and bilateral donor agencies, civil society and the private sector to further contribute to the implementation of the Special Initiatives agreed by the Summit and the actions set out above;

14. *Resolve* to meet before the end of 2013 to review the progress of implementation of the current declaration and consider the directions for further work.

We make these commitments with a view to strengthening the knowledge and information infrastructure needed to advance human well-being and the three pillars of sustainable development: economic, environmental and social.

[3] Adopted at the 11th Special Session of the Governing Council/Global Ministerial Environment Forum of UNEP in Indonesia, 25 February 2010.

II. Executive Summaries of approved Special Initiatives

A critical objective of the Eye On Earth (Eye on Earth) Summit was to ensure that there were compelling, specific, achievable outcomes that translate the principles of the Summit to "on the ground" commitments and actions. An original target of four to six Eye on Earth Special Initiatives (SIs) was set, each of which was defined through the Summit preparation process, and the final outcome were eight Special Initiatives announced during the Closing Plenary. The chosen initiatives are to fundamentally improve the landscape of environmental and societal information networking for the benefit of mankind, and from which compelling, tangible results can be achieved in the medium term. As such they have the following fundamental characteristics:

Potential to be an agent of change of historical proportions and impact. An Eye on Earth Special Initiative must address one or more core objectives and themes of the Eye on Earth Summit in a way that will fundamentally change the face of environmental and societal information networking in a substantive, systemic, and sustainable manner;

Identified as a compelling and common need across the Eye on Earth stakeholder community. An issue or outcome that is acknowledged as a critical need across a majority of the concerned Eye on Earth stakeholder community;

High level support and commitment. The explicit commitment of a constellation of concerned major stakeholders who have the access, influence, commitment and resources to catalyse and implement change. Special initiatives must therefore engage the Donor Community;

Implementable within a reasonable period of time. A viable Eye on Earth initiative must be specific and achievable enough to accomplish key, measurable results within 3-5 years;

1. Eye on Global Network of Networks

A network of networks would begin to overcome the lack of data, network and human connectivity which currently exists and in so doing create scope to realise the monitoring, understanding and implementation opportunities.

The aim of the Global Network of Networks (GNON) is to realise this potential by developing a common vision and by building on and linking current advances. The GNON SI will encourage and promote developments which strengthen the networking of environmental information at global, regional, sub-regional, national and local levels, including the establishment of strong institutional arrangements and synergies, and helping to align relevant existing and planned networking activities. These developments will be guided by a set of principles and a conceptual framework arising out of the common vision, which will allow the different players to find their place in the overall network of networks to exercise their role, thus enhancing the way in which they will be able to contribute to and benefit from the whole.

In this manner, the GNON SI is a foundational element of the Eye on Earth outcomes providing a framework for interaction, sharing and interoperability among and between the other Special Initiatives, integrating information activities along the data-information-knowledge chain.

Furthermore, the Global Network of Networks SI is a concrete response and contribution to the current global debates on international environmental governance (IEG) and on the International Framework for Sustainable Development (IFSD). It will support capacity building and sharing knowledge on managing and using environmental information for decision making activities. A key strategic area for advancing the information exchange agenda is the application of Principle 10 of the Rio Declaration on access to information.

2. Eye on Environmental Education

Awareness and education precede responsible decisions, policy-making and actions, by individuals, organizations, and nations. There are numerous environmental education and awareness programs around the world addressing parts of this need at multiple levels, but there is no common knowledge management infrastructure of available materials, curricula, best practices, data networks, educators, and other resources. This initiative seeks to build a networked commons of collaborating entities and resources, based on the alignment and strengthening of existing programs and networks.

The Eye on Environmental Education Special Initiative (Eye on EarthESI) is designed as an educational contribution towards sustainable development guided by the objectives of the Eye On Earth Summit - Abu Dhabi 2011 ("The Summit"), within the ongoing UN Decade of Education for Sustainable Development, 2005-14. It consolidates and builds on other existing Environmental Education (EE) initiatives so as to collectively and effectively contribute towards sustainable development through four key educational arenas (formal, non-formal, informal and capacity building).

To effectively address sustainable development issues and challenges, the Eye on EarthESI proposes compelling, specific, achievable outcomes that translate the principles of the Summit to "on the ground" commitments and actions for sustainable development. All the key educational arenas of formal, non-formal, and informal education as well as capacity building have been targeted by the Eye on EarthESI for tangible results and outcomes. The Eye on EarthESI also involves all the regions of the world for widespread and sustained impact.

To ensure effective delivery, the Eye on EarthESI has identified key considerations with the following guiding principles for implementation:

- Educational arenas for intervention: formal, non-formal, informal and capacity building/enhancement;
- Regional delivery targeting six regions: Africa; Asia and Pacific; Europe; Latin America and the Caribbean; North America; West Asia);
- Eight Flagship Initiatives: Educational Support - Comunicacion y Educacion Ambiental SC; Global University Partnership for Environment and Sustainability (GUPES); My Community Our Earth (MyCOE); ECO Worldwide; GeoSUM - GeoInformation for Sustainable Urban Management;In-Service ICT Training for Environmental mid carrier Professionals to secure access and ability to use available Environmental Information (ISEPEI); The Seasons Project; Environmental Information System Hub; and
- Global Environmental Education Academy/Coordinating Unit: This will support, coordinate, monitor and evaluate the Eye on EarthESI.

For purposes of implementation and allocation of responsibilities and resources between the implementation teams, project partners, participating countries and participating organizations, the Eye on EarthESI activities have been classified into Initiative-Wide Activities, Educational arena/Sector-Wide Activities (formal, non-formal, informal and capacity building), Regional activities (Africa; Asia and Pacific; West Asia; Europe; Latin America and the Caribbean; North America), Flagship-specific activities, and Special Eye on EarthESI activities.

3. Eye On Access for All

There is considerable support in the Eye on Earth Community for "the development of adequate institutional and legislative enabling conditions for furthering the implementation of Principle 10 of the Rio Declaration". All the working groups and a significant supportive vote within the Eye on Earth Community advocated the development of this Special Initiative that brings UNEP, key civil society networks such as the Access Initiative and Regional Environmental Centres (Central and Eastern Europe, Caucasus, Central Asia, Russia and Moldova), Aarhus Centres, the European Eco Forum, national governments and related agencies and other UN entities (e.g. UNECE, UNITAR) together to help implement Principle 10 globally. Principle 10, one of the major outcomes of the Rio summit in 1992, recognizes and stresses that environmental issues are best handled with access to information, citizen engagement and access to remedies and redress.

This Special Initiative will perfectly complement the other Eye on Earth Special Initiatives (in particular the Eye on Global Network of Networks Special Initiative) by addressing an overarching and key aspect of access to information that is relevant for all the other suggested initiatives. It will also contribute to the creation of an enabling environment that will ensure the maximum impact of the other initiatives including better usage of the available data and information. Furthering Principle 10 implementation is therefore fundamental to the success of the Eye on Earth.

The Special Initiative on Access for All will bring together stakeholders who recognize each other's work, yet have had no chance to actively collaborate and participate in shaping and accomplishing a common shared vision of an accessible world of environmental data that can help support better decisions and stronger involvement of all those affected. Rather than organizing yet one more project, this initiative will establish an action platform of equals, where organizations with interest in Principle 10 implementation can draw strength from each other while sharing common experiences and even linked projects under the right conditions.

4. Eye on Community Sustainability and Resiliency

The initial Community Sustainability and Resiliency (CSR) SI was framed by a core team composed of public and private stakeholders. It is designed with an overall goal of establishing an international forum to link current global urban sustainability and resilience initiatives in order to promote and facilitate sharing of information, concepts, challenges and solutions, including urban information infrastructure, not only along the North-South axis but also between cities of the South. Recognizing that access to data is only one part of what is needed to address urban problems, a second supporting goal focuses on enhancing - through training and workshops - the capacity of urban professionals to effectively use the data and the information.

The CSR SI also includes a pilot project entitled "Geospatial Sciences for Sustainable Development in Africa" (GSSDA) that focuses on accomplishing the goals of the larger project. GSSDA is centred on the Lake Victoria region of Africa, specifically on 15 cities in the five countries that surround the lake. The two- year project will develop a geospatial database of fundamental datasets for the region. High-resolution imagery will be used for urban environmental and sustainable development programs, and will serve as a practical tool to address priority development issues. The data collected by the participants will be made widely available on a public web platform, and will be maintained and updated through collaborations with regional centres of excellence and Geographic Information Systems (GIS)-focused university departments in the region.

5. Eye on Oceans and Blue Carbon

Prosperous economies are built on a foundation of information, and depend on a healthy global environment, including the ocean. Better data enable better decisions, healthier ecosystems, and healthier people. "Blue Carbon" is a strategic approach to capitalize on the globally significant carbon storage and sequestration potential of coastal ecosystems (namely, mangroves, saltmarshes, and seagrasses) in order to ensure more effective and sustainable management of these ecosystems and their services. However, Blue Carbon is an emerging approach to management, whose uptake and success is limited by key data and capacity gaps.

Oceans and Blue Carbon are a key topic for the 2011 Eye On Earth Summit. The Eye on Earth Blue Carbon Special Initiative will transform the quality and accessibility of coastal ecosystem data, and build local capacity to develop, use, and interpret it. This will enable climate-smart planning for enhanced climate change mitigation and adaptation and biodiversity conservation in the marine environment. In turn, this will enable greater fulfillment of national and international commitments to reduce climate impacts and safeguard biodiversity and human well-being.

The Eye on Earth Blue Carbon Special Initiative presents a unique opportunity to transform approaches to crucial but long-neglected monitoring activities in the marine and coastal environment. It will catalyse a fundamental change in the way coastal ecosystems are understood, valued and managed, and it will enable mainstreaming of coastal and marine issues into broader environmental management.

6. Eye on Disaster Management FALCON

The FALCON initiative is being framed by a Special Initiative team as a Public-Private Partnership (PPP) to strengthen existing networks and support GIS and spatial data infrastructure capacity building for more effective disaster planning and response and climate change adaptation. Special emphasis will be on disaster resistant community development and resiliency in the most vulnerable communities and countries in the world.

This initiative would combine technology and expertise contributions of private sector companies, alignment with and strengthening of existing governmental, intergovernmental and multi-stakeholder programmes, and direct cooperation with international finance, development aid agencies and foundations, to help target countries and communities and develop the human, institutional, and technical frameworks and spatial data infrastructure needed to better plan for and respond to natural disasters. The initiative will look to align and strengthen existing efforts where they are underway, and to establish new programmes where they are most needed.

7. Eye on Water Security

The aim of the Eye on Water Security Special Initiative (EoWSSI) proposes to realise this potential by developing a common vision and by building on and linking current advances using a network-of-networks approach. It does not intend to address all of the issues surrounding management of data, information and knowledge in the water domain, rather, it will focus on applying maturing technological capabilities – namely, the semantic web and "cloud computing", to start bridging gaps in the discovery and application of existing data, information and knowledge resources, and in lowering the barriers to publication of those resources, particularly for motivated developing countries.

The EoWSSI will encourage and promote developments which strengthen the networking of water data, information and knowledge at global, regional, sub-regional, national and local levels, including the establishment of strong institutional arrangements and synergies, and help to align relevant existing and planned networking activities. These developments will be guided by a set of principles and a conceptual framework arising out of the common vision, which will allow the different players to find their place in the overall network of networks to exercise their role, thus enhancing the way in which they will be able to contribute to and benefit from the whole.

8. Eye On Biodiversity

The Eye on Biodiversity Special Initiative concentrates on the incentives required to motivate people to share their information and data on biodiversity.

By sharing more, it is more likely that the best information and data on our key natural resources will be better used in decision making at all levels, for the planet's long term health. This SI is based on the principle that providing more benefits to the provider of a resource will result in increased sharing of that resource.

There are a lot of information and data in the world which can help us address the substantial challenges we currently face. There is much collected which is not shared, and much shared which is not connected and visible. Despite significant international efforts to enable and promote data sharing, the systems that do exist are often under-used, and lack incentives. This results in decisions based on incomplete information, duplication of monitoring effort, and a high cost to discovery of information and data.

There is always a cost to sharing: cost of cleaning and preparing datasets, loss of control, time required to act on requests for information, and so on. The challenge is to provide an infrastructure where the benefits from sharing are simple, immediate and self-evident. The incentives in the SI are primarily *not* financial, but focus more on more sustainable angles such as profile and acknowledgement, tools for simplifying data management, and combined with a broad movement to reward and require sharing of information and data.

Biodiversity and ecosystem services are fundamental to human wellbeing. Economic and social issues often overshadow biodiversity and conservation, in part because the direct connection between these factors and human wellbeing is often not well understood. There is clear benefit in making sure these data, and the knowledge they help to articulate, are fully available to decision-makers and wider society. By actively sharing what we know, the issues will be more clearly articulated, and more likely to feature prominently in national dialogues, policies and priority setting.

III. Executive Summaries from the Working Groups (including recommendations)

Working Group 1 - The vision for Policy, Governance and Institutional Networking

> **"In sustainable development, everyone is a user and provider of information considered in the broad sense. That includes data, information, appropriately packaged experience and knowledge. The need for information arises at all levels, from that of senior decision makers at the national and international levels to the grass-roots and individual levels. The following two programme areas need to be implemented to ensure that decisions are based increasingly on sound information: Bridging the data gap and Improving information availability."**

This text is a quote from Chapter 40 of Agenda21, written almost twenty years ago. And the fact that it could well reflect the current discussions around the Eye on Earth Summit is indeed sad commentary on the challenges faced by governments, civil society and industry in advancing this vital agenda in the intervening years.

Hope for further movement of the agenda can be found in several recent positive advances:

- Organizations are finding ways to share assets and develop collaborative strategies towards a common goal of improved environmental assessments and a better, evidence-based decision processes for government and civil society;
- The technology of data capture, transmission and display is far more affordable and pervasive today, and its use has empowered individuals and organizations to accomplish much.

The Eye on Earth Summit can foster the launch of a new collaborative platform of action between governments, civil society, industry and academia that can take advantage of these advances and create new, effective and affordable ways to make progress on the Chapter 40 promises of a prior generation. A vision that justifies this statement was crafted by WG1 and is put forth for consideration as a Summit Declaration foundation:

"We envision that decision-making and actions at all levels take into account, and people everywhere are empowered by, the availability of and access to timely, credible and relevant environmental, social and other information in order to achieve sustainable development".

Major Guiding Principles

The vision for the role of environmental information in Sustainable Development will be achieved through the application of the following principles, which apply to policy-making, governance, and networking. With respect to policy-making, power and function should be polycentric and distributive (policy implementation should take place at the appropriate level), should embrace diversity and change, and should strive for inclusiveness, bearing in mind vulnerable individuals and communities. Regarding knowledge governance, it should be distributive, needs-based, and data management should occur as close to the source as possible. Other principles include:

- Capture once, use often (monitor once for timely and multi-purpose uses)
- A light policy and governance framework for information sharing
- Find synergy in cross-disciplinary approaches
- Use incentives in support of mandates
- Light but effective governance
- Measure performance through metrics, with attention to quality
- Transparency and accessibility of information
- Accountability
- Respect personal privacy

Institutional networking should be governed by principles of equality, participation, collaborative networking, and subsidiarity. The agenda should be issue focused and purpose driven and equitably owned by all participants, flexible yet durable, and taking advantage of new tools of networking and collaboration while building trust through human relationships. Ideally, it should build on existing networks. The chaordic principles, addressed elsewhere in the full document, are a good starting point.

A key infrastructure to underpin Environmental Information are Local to Global Spatial Data Infrastructures, something addressed in WG3 work; however, understanding the Data-Information-Analysis-Policy Making-Implementation Relationships is key and in order to find the financing required for the technology solutions, it is important to make a strong case for investment in Information Databases and Technologies to support Sustainable Development. Finally, rather than focusing on governance and policy mechanisms, the WG agreed that it would be more important to look at Networks of Networks in their totality, a theme taken up by another WG.

Implementation of Principle 10 of the Rio Declaration on access to information

Principle 10 states: At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.

It is the globalization of the P10 that Working Group 1 aspires to support through specific projects and a planned Special Initiative. Without guaranteeing access and use of information by people as individuals, we lose the improvements, empowerment and involvement made possible through collaboration. It is for this reason that communicating environmental information must be an open and two-way process that engages governments, private sector and civil society.

Working Group 2 - Content and User Needs

The importance of sharing Environmental Information (EI) has been identified by a number of Summit declarations and Agendas over the last 20 years. It is only in the last decade, however, that technology, governance, information and capacity are converging to enable the effective sharing of Environmental Information.

In order to facilitate this convergence, from a Content and User Needs perspective, there are a number of key principles that need to be kept in mind. These key principles include:

- A need for relevant, high quality EI.

- The existence of environmental challenges from a global scale through local scale, and in the future, these challenges will become more complex in nature.

- The consequence of inaction around EI is that, inevitably, management responses will fail.

- The need to find the ‘right’ information, and to use it to address the challenges that emerge.

• Environmental Information Systems (EISs) should deliver specific types of functionality.

• An effective EIS needs to be a fluid, organic ecosystem of data and information.

• All levels of societal organisation need to be acknowledged and encouraged to contribute to multiple roles in the EIS in a simultaneous manner.

• The most appropriate tools should be used to facilitate inter-personal communication.

• Data providers need to communicate with Users and acknowledge that the conceptual framework of each user is unique and is related to a specific task and its achievement.

• Everyone in the world can be an Actor in an EIS.

In order to highlight the challenges surrounding Content and User Needs, ten issues were identified and discussed in depth. These challenges include:

1. The creation of incentives for uniting stakeholders in processes, which reflect the organic and systemic nature of environmental information.

2. Addressing the difficulty of simplifying large datasets to assist with decision-making.

3. The building of mixed models of old, new and emerging technologies such as ground stations, sensor webs, satellites, crowd sourcing and data mining.

4. The need to communicate creatively through using multiple user-friendly formats, common delivery vehicles and multiple languages.

5. The need to address critical capacity requirements as they directly impact on content and user needs.

6. Characterization of the state, trends and outlooks of the environment.

7. The need to support environmental governance.

8. The need to integrate environmental and socio-economic data.

9. The need to empower people through open access to environmental information.

10. Provision of effective global surveillance and early warning systems.

Key recommendations for “quick wins” emerging from this White Paper are:

• A need to digitise legacy data and link indigenous people’s perspectives into visualization techniques and products.

• The capture and integration of culturally traditional knowledge with crowd sourced data in order to deliver a ‘real world’ impact.

• Governments should institute legislation formalising the human right of access to information.

• All organisations should undertake major focused data collection exercises.

Working Group 3 – White paper 1

Many different information infrastructures and systems exist that have their own political, economic, social, technical, and legal contexts and boundaries. These infrastructures carry precious resources that could help answering important questions about our environment, and could contribute to making informed decisions.

This White Paper proposes a generic framework to help understand, and make recommendations on, how resources embedded in information infrastructures and systems can be efficiently discovered and re-used in an interoperable way. Addressing the themes of the Eye on Earth Summit, this framework is intended to help global leaders, innovators and decision-makers focus on an issue critical to the wise decision-making upon which our planet's future depends: how to ensure effective access to the world's expanding pool of environmental and societal data by all of those who need it. The Eye on Earth Summit draws policymakers and specialists together to define key issues regarding data accessibility. The topics covered by this paper are intended to strengthen existing efforts and inform a search for unified, global solutions to the issues that impede access to data. The paper lays out issues to help reach consensus on solutions to greater data accessibility, describes promising existing initiatives and, where necessary, recommends new ones.

Environmental information systems are built, and data is collected, to serve a purpose. The actual use makes data valuable – it provides answers to questions of relevance to a nation, to a community or to individuals, and helps to create evidence required for planning and decision-making. But there is more to decision making than just the data. It is a complex process, typically involving data, models and simulations, knowledge, and finally the plans or the decisions, thus creating a value-chain in which the value of information increases.

The domain of environmental information systems and infrastructures is constantly affected by changes that happen in the political, economic, social, technical, and legal contexts. These changes provide windows of opportunity that can–and should–be used to embed common principles in existing infrastructures and systems, allowing the resources to be used outside the boundaries of a particular infrastructure. One aim of this paper is to briefly highlight some of the changes that are finding their ways into how information is collected, managed, analyzed and used for decision making.

It is difficult to discover and assess, access, and integrate resources across different infrastructures in one single application. The reasons can be manifold. Mentioned here are obstacles related to interoperability: 1) the inability to interact with infrastructures through well-known, standardised service interfaces in order to find, understand, access, and annotate resources; and 2) the inability to easily understand, integrate, and transform the data and information made available through the infrastructures and systems in a multi-lingual, multi-community context.

A version of the data, information, knowledge pyramid is used to help distinguish three types of infrastructures or systems that can provide added value to the decision-making pyramid, namely: data and information infrastructures; model and simulation infrastructures; and planning and decision support infrastructures. Thus, the discussion on the access to and use of resources is not limited to data infrastructures, but includes also models and simulation infrastructures, knowledge infrastructures, and decision support infrastructures. In addition, the paper addresses rapidly evolving capabilities of the web including social networking, crowd sourcing, human sensor networks, etc. In these, the value of the information may be immediate with little processing. This new type of low-level actionable data is driving new approaches to the creation, discovery, and use of data, based on new enabling technologies. These provide new possibilities for environmental information "systems" that may bypass previous approaches that are heavy in terms of infrastructure requirements and expensive in terms of capacity building. As often observed, cell phone technology bypassed the requirement for laying copper land lines in developed and

especially developing countries. This paper also examines new technology approaches that may bypass heavier platform infrastructure approaches.

In addition to the framework for understanding, recommendations are made for stakeholders to engage the issues suggesting alignment opportunities and/or constraints. These include:

Recommendation 1. It is recommended that the design of environmental information systems and infrastructures consider the use of ISO 14721:2003 Reference Model for an Open Archival Information System (OAIS) when implementing measures for the preservation of resources.

Recommendation 2. It is recommended that an open-source cloud service for hosting environmental/spatial data and services be implemented at a global level to support the staging of geoservices by developing countries´ agencies that lack appropriate ICT infrastructure.

Recommendation 3: It is recommended to initiate a discussion between key environmental agencies and standardization bodies on shape and form of value adding service chains, their catalogues, discovery services, standards, and a market place towards the seamless integration and reuse of integrated modeling and decision suppo Irt services, i.e. infrastructures of modeling and decision support systems.

Recommendation 4: It is recommended that the UN establish a World Location Framework in cooperation with the relevant UN coordination bodies such as the Expert Committee on Global Geographic Information Management (GGIM), the UN Group of Experts on Geographic Names (UNGEGN) and the UN Geographic Information Working Group (UNGIWG) supported by the Office of Information and Communications Technology (OICT) of the UN Secretariat, as well as interested observing parties.

Recommendation 5: It is recommended that the infrastructure of the Group on Earth Observations (GEO) and the relevant standardisation organizations establish a peer-reviewed, structured registry of best practices in geospatial interoperability.

Recommendation 6: It is recommended that a Temporal Framework be formalized and promoted.

Recommendation 7: It is recommended that resources in environmental information infrastructures be made available following the Linked Data approach and technologies.

Recommendation 8: It is recommended that common tools be established that implement the World Location Framework, the Temporal Framework, and the Semantic Framework, and that provide access to the required registries.

Recommendation 9: It is recommended that common services be established that implement the mentioned frameworks.

Recommendation 10: It is recommended that process for updating the technical framework be established.

White Paper 2

The themes of the Technical Infrastructure Working Group that directly address the issues being discussed in this paper are 1) shared, multi-purpose technical infrastructure, and 2) technology support and capacity building. These themes contain, in principle, the main issue areas of this paper; the establishment, maintenance, and operation of a global environmental knowledge network in support of, and supported by, shared environmental data and information systems; and the educational outreach, including online educational material, and best practices for Earth observation and environmental network lineage.

Knowledge networks, in general, are infrastructures that facilitate the harvesting and dissemination of knowledge about the network and what the network supports. They are usually associated with communities of interest. For example, the Teaching-Learning community has a knowledge network in the education space, and the Food and Agriculture Organization of the United Nations (FAO) supports a set of theme-based knowledge networks which support virtual communities formed around the interests of sustainable agriculture and food security.

This paper will address the scalability issue associated with global, cross-community environmental knowledge networks, where environmental knowledge networks, for the purposes of this paper, will be considered knowledge networks focused on environmental data and challenges. There are many opportunities associated with these networks. Some opportunities addressed in this paper include:

- the integration of social media networks and frameworks;
- the use of semantics and a semantic framework to more easily bring together knowledge from diverse communities in the network;
- the use of one or more educational portals to provide certified online training courses to grow and maintain the set of individuals qualified to build, maintain, and manage environmental networks;

White Paper 3

The behavior of Earth's environment, including global change and interactions among geophysical, biological and human processes, can be understood on the basis of observational data and derivations thereof. Those derivations may include, for example: metadata, information, knowledge, opinions, evidence, decision support mechanisms such as models and simulations, decisions themselves, and other components of data-driven infrastructure. Crowdsourcing contributions in the context of this article refer to the provision and life cycle management of those data and derivations thereof, herein referred to as "resources." More specifically, we focus on those resources related to the physical environment and its ecosystems, and are germane to studies of the environment, impacts on it, and its impact on other systems. Additionally, such resources might be contributed by – or outsourced to via open call – potentially large numbers of individuals that may not necessarily be either environmental or information specialists, yet are willing and able to contribute such resources – directly or indirectly, anonymously or non-anonymously – of value to analysis and decision-making in science and society. This might be referred to as distributed problem solving, and in some cases may in some cases be superior to more concerted centralized problem solving efforts (e.g., "The Wisdom of Crowds", Suroweiki, 1994)

This paper addresses challenges associated with crowdsourced environmental resources such that they are useful to a range of stakeholders. We propose that multiple architectures and approaches are needed to address such challenges. Section 2.2 provides essential background whereas important issues, challenges, and opportunities are described in Section 2.3. In conclusion, we discuss a number of possible future directions, supplemented by key recommendations.

Crowdsourced resources may come in many forms from many sources and -- to be used effectively – the data must be identified and described in meta-data. While this process of description is a huge challenge for focused scientific, government agency and corporate data collection efforts, the challenge is even greater under the circumstances where crowdsourced resources are collected and contributed from myriad individuals through crowdsourcing. Such crowdsourced data will be of greatest use in tracking and modeling environmental change at all scales, specifically for trends and instantaneous phenomena, when associated metadata adhere to standards that have emerged for widespread global use across governments, industry and science. This is an ambitious goal, and recommendations are made in respect of how this may be achieved.

A range of infrastructure or architecture frameworks are needed and are emerging to enable efficient crowdsourcing of resources. One emerging approach for crowd sourcing of environmental data is that of *Resource Nodes* where the goal is to provide server nodes distributed across the Internet that make it easy to share, find and download relevant resources using open standards. This approach would also include the proliferation of standardized services or APIs to expose resources implicit in social networking sites, online communities, and content hosts.

This approach is already complemented by one or more large, *Global-Scale Platforms* that aim to unify resources from both traditional and crowdsourced infrastructure. These platforms are more likely to be preferred repositories for voluntary contributions on a large scale, because of higher visibility. For the purpose of this paper, *Resource Nodes* and *Global-Scale Platforms* provide a language for discussion; however, we note that their descriptions fall at either end of a spectrum of crowdsourcing infrastructures, from highly distributed to highly centralized.

Key questions in both of these generic architectures revolve around how metadata will be generated and maintained, quality assurance and provenance, archiving and preservation of data, and the trust placed in the resources. These are discussed in more detail in the document and recommendations are made in this respect.

Parallel evolutions often foster innovation and no single approach will likely meet all the needs of scientists, policy makers, and local to global communities, and therefore, multiple architectures for environmental crowdsourcing should continue to be developed and supported. Among the themes of the summit to which improved crowdsourcing will contribute include:

- improving local to global information infrastructure to support more coordinated, effective and sustainable development,
- expanding useful data available to decision-makers,
- supporting technical interoperability and cooperation to accelerate the building of federated and loosely connected global environmental information infrastructure,
- and strengthening access to resources to support developing countries and communities impacted by environmental justice issues.

Further, these approaches enable a much broader spectrum of citizens from across the globe to actively participate in citizen science in their own communities, and to contribute their collective opinions and decisions. Crowdsourcing is bolstering accumulation of much richer observational archives for all parts of the world; archives that may be tapped by scientists globally to achieve better understanding of the dynamics of our environment. We anticipate that scientists, the public, and decision makers will have increasing opportunities to take advantage of crowdsourcing.

At the Eye on Earth Summit, invited guest speakers in the sessions of the Technical Infrastructure Working Group (WG3) will explore emerging means by which, for example, observations of ordinary citizens may feed into, complement, and expand the globally distributed environmental observation collections acquired and funded by government agencies, industry and academic programs and scientists.

White Paper 4

Information and communication technologies (ICTs) have now permeated into every aspect of society. Therefore it is pertinent to explore their roles in dealing with the challenges of managing and protecting the environment. ICTs contribute to environmental management in six areas, namely: monitoring, analysis, planning and management, and capacity building. In addition, ICTs have major impact on climate change mitigation and adaptation.

Earth observing satellites and other remote sensing systems provide vast amounts of data for monitoring the environment. These depend on ICTs systems, as do other sensor technologies. ICTs also facilitate the communication of the collected data sets, and provide the tools for performing computations and analysis to derive the information embedded in them, and present the knowledge for visualization and comprehension to make decisions. They provide tools for wide dissemination of varied information and knowledge products both for formal education and general awareness raising situations to involve the general public in dealing with environmental issues.

ICTs contributions for climate change adaptation and mitigation include support for measures to reduce GHG emissions, reducing or replacing travel with remote meetings and working arrangements, and improving energy efficiencies.

Developing countries have a challenge to utilize ICTs due to funding reasons or the need to build human capacities capable for adopting such technologies in their environmental decision making process. International cooperation is considered a key issue for enhancing the management of national and regional natural resources.

Working Group 4 - Capacity Building, Education and Awareness Building

The complexity of environmental policy, especially policy that includes sustainability, has not been matched by society's ability to organize and access environmental, earth observation, and societal information. While the sophistication of sensor technologies and sensing platforms of all types has increased to meet the demand for complex information, our ability to deliver it, provide access and most importantly to create coherent messages and easy access for all segments of society has not improved at the same pace nor in a geographically uniform manner.

The Eye on Earth Summit envisions a transparent and collaborative process that will improve the organization, access and delivery of information through a federated global information and earth observation system. This vision will require parallel development of demand for information, capacity building as well as sustainable long term funding. The demand for organized data will not spring simply from the existence of such a system or framework, but from concerted capacity building efforts. These efforts should instil knowledge of the use of environmental and earth observations information in our educational curricula, government at all levels, civil society, science and engineering institutions.

Capacity building, in this context, should aim to develop a global, open, and interoperable network of environmental information and data, to allow governments, organizations, institutions, and civil society to make and participate in more effective policy decisions that directly affect their lives and the environment.

<u>The Problem and Supporting Issues</u>

The overarching problem addressed in this White Paper is "How can the promise and value of a federated and global environmental and earth observations network be realized through capacity building that builds demand for effective use and communication of the information that the network contains?" An answer to this question is the construction of a capacity value chain that includes: (1) increasing the supply of environmental information; (2) increasing the demand for environmental information; (3) increasing access to a broader range of potential users of the information; (4) increasing society's ability to effectively use information; and (5) sustaining the capacity and networks that are produced.

For purposes of discussion the components of the value chain are presented as five issues in the White Paper:

1. How can institutional capacity be increased to maximize the use of information for decision and policy-making?

2. How to ensure that Civil Society has access to environmental information that is essential for effective public participation?

3. How can the environmental knowledge base be expanded to include locally sourced data and public engagement as a way of increasing the relevance to potential users?

4. How can educational curricula and opportunities for education for all sectors and genders be revised to increase potential use and the efficacy of use?

5. How to ensure that existing environmental information networks (EINs) are sustained and that proposed EINs are established in a sustainable way, and that the value of networks is globally recognized?

Opportunities and Constraints

The vision of developing a global, open, and participatory interoperable network is a grand one and there are opportunities for moving the idea forward including:

• The current state of environmental technology

• Rapid developments in social networking technologies based on increased access to high speed internet, smart mobile devices, and simple cellular devices

• Ability of developing countries to leapfrog technologies

• Improvements in monitoring and sampling technology

• On-going work of member countries and regions to develop information and assessment networks

• NGO and multilateral organization initiatives under MEAs, cooperative frameworks for observation and monitoring.

• Access and open government initiatives

Constraints to this vision can include:

• Lack of demand for generating this type of network

• Assured funding at an adequate level

Working Group 5 - Applications Showcase Working Group White Paper

The Applications Showcase Working Group (WG5), as previously mentioned, focused on issues that are more application focused and sought to identify a set of interesting applications that could be featured as part of the Technology Showcase and Innovation Forum. Through the WG5 deliberations, it was identified that the focus areas were revolved around the issues of open data, access and discoverability; data visualization, analysis and storytelling; and citizen/civic science, crowdsourcing and sensor networks.

The following paper describes these issues from the perspective of applications to an extent that generalized the issue areas understanding that most of the issues are covered in greater depth within the other Working Groups.

Because WG5 is cross-cutting in that it is seeking to identify solution sets that address the major issues covered within the other Working Groups, WG5, based also on feedback from the first Framework Committee meeting, will act as a more integrated function as part of the Summit Day 1 streams. In other words, rather than WG5 having its own dedicated stream like the other Working Groups, WG5 will integrate 3-5 minute flash and multimedia talks at integral points to provide the audience with an interesting application that provides a novel solution to the issues being discussed. In this way, the other four Working Group streams can be provided with more positive examples of how progress has been made in many ways that will hopefully open new perspectives and ideas within the delegations present at Day 1.

As the Summit process moves forward, and based on further feedback from AGEDI and the Framework Committee, a team will be developed to secure priority exhibitors to populate the Technology Showcase and Innovation Forum. The hope is to have very interesting and innovative applications and stories be

presented at these forums with balanced representation when considering the organization type and geographic region.

Other factors such as cost, subsidy, partnership, sponsorship, availability, etc. will also have to be considered as part of this process.

IV Summary of the Civil Society Forum (11 December 2011)

The Eye on Earth Civil Society Forum (CSF) on "Greater Access to Environmental and Societal Information" was held on December 11, 2011, prior the Eye on Earth Summit Abu Dhabi 2011. The Forum was attended by over 70 participants from 39 countries, who prepared their recommendations to the Eye on Earth Summit. The Forum's agenda was unique in that, for the first time, all of the 9 major groups had a focused discussion on the issue of access to environmental information.

The forum reviewed and consolidated inputs on the draft Eye on Earth Declaration of the Summit to be adopted on 15 December 2011, and discussed a number of themes including Policy, Governance and Institutional Networking; Content and User Needs; Technical Infrastructure; and Capacity Building, Education and Awareness Building.

The following are the recommendations emanating from the discussions:

Recommendations from Working Group 1 on Policy, Governance and Institutional Networking

The group mainly focused its deliberations on the White Paper and the recommended Special Initiative on the implementation of Principle 10. The group agreed that there is a need to reaffirm that access to information is a fundamental human right, and that it is necessary to adopt a human rights approach to the implementation of Principle 10, and recommended to the Eye on Earth Summit that:

1. Several instruments are established - legal instruments at both global and national levels, as well as implementation mechanisms (financial, institutional and networking) and appeal mechanisms to support access to justice.
2. Ensure that the following key principles are embedded into our approach to access to information: governance, accountability, and monitoring.
3. Communities are empowered through building their confidence, providing adequate tools, as well as the required funding.
4. Capacities of officials are built.
5. The concept and the principles of shared environmental information systems be promoted, including: (i) setting measurable targets; (ii) prior and informed consent of communities for sharing and use of biological information; (iii) contributing to multilateral environmental agreements.

The group also discussed the Eye on Earth Summit Declaration and suggested the inclusion of a specific reference to the establishment a Global Treaty on environmental democracy to be launched at Rio+20, for the implementation of the Principle 10 of the Rio Declaration.

Recommendations from Working Group 2 on Content and User Needs

The group focused its discussions on connecting communities to policy makers: the search for appropriate communications mechanisms that facilitate the flow of information and knowledge in all directions regardless of geographic and social context.

The group identified three issues which need further consideration by the Eye on Earth Community:

- The disconnect between communities, implementing agencies and policymakers;
- The convergence of traditional information systems, modern systems and intermediate technologies;

- The flow of information is not just from government to communities. Communities are sources of valuable information. Communities hold information that is relevant for policymakers and implementing agencies, including traditional knowledge.

The group made the following six recommendations to the Eye on Earth Summit:

1. There is an urgency to meet the information needs of rural people and communities. Rural people must be beneficiaries of information.
2. Government-held environmental information should be released in a pro-active manner. The information must be released in useable/appropriate formats, locations and languages consistent with international norms/best practice and open data principles (complete, primary, timely, accessible, machine readable, on-proprietary, open-license, reviewable, discoverable, permanent). This includes formats for people with disabilities.
3. Information (held by government and the private sector) about conditions that may harm human health/wellbeing and the environment is not proprietary and should be released to the public.
4. There is a need to identify the information needs of the various end users (*e.g*., stakeholders).
5. Governments should strive to ensure information is correct and not misleading. Information should be released in a timely manner.
6. Governments must recognize the value of community-held information.

Recommendations from Working Group 3 on Technical Infrastructure

The group made the following recommendations to the Eye on Earth Summit:

1. Increase awareness and advocate for the use of Information and Communication Technology (ICT) as a mechanism for getting environmental information across to relevant stakeholders (for example: social media/SMS updates on meteorological data for farmers; radio messaging in disaster situations; Google maps); and as a way to enhance citizens' engagement in environmental management.
2. Increased use of ICTs to support the adaptation to and mitigation of the impacts of environmental challenges e.g. climate change.
3. International cooperation is considered a key issue for enhancing the management of national and regional natural resources through the use of ICTs.
4. Support the provision of technology transfer (N-S and S-S) on opportunities for improving the technical infrastructure for data gathering, analysis and sharing in developing countries, such as an open-source cloud service for hosting environmental/spatial data and services be implemented at a global level to support the staging of geo-services by developing countries' agencies that lack ICT infrastructure.
5. To promote the use of ICTs in the transition to the Green Economy e.g. through addressing the issue of e-waste (e.g. ITU's international mobile charger standard).
6. ICT for sustainable development: increased use of ICTs to support the adaptation to (with a focus on vulnerable groups) and mitigation of the impacts of environmental challenges e.g. climate change, e-waste.

The group concluded by sending the following message to the Eye on Earth Summit: If not now, when?

Recommendations from Working Group 4 on Capacity-building, Education and Awareness-building

The members of the group indicated a number of important issues in relation to the discussion topics. The group reviewed the White Paper presented by Working Group 4 and reiterated the importance of the following issues, as highlighted in the White Paper:

1. Environmental education should be incorporated in Primary-High school curricula;
2. Enhance distance learning programmes at all levels;
3. Support development of lifelong learning programmes focused on environmental information (university and professional training);
4. Inclusion of traditional knowledge from indigenous communities;

5. Awareness and acknowledgement of data origin;
6. Special arrangements for access to information for Environmental Education Institutions;
7. Support multilingual access to environmental information;
8. Special attention should be paid to developing countries and countries in transition.

The group also called for amendments in the declaration to include the following:

- Indigenous people's knowledge requirements;
- Multilingual access to environmental information;
- Lifelong environmental learning programmes.

The group reiterated that civil society wishes to be involved in the development and implementation of the Special Initiatives, and called for further clarifications on the mechanisms for civil society's involvement.

The group also discussed the Eye on Earth Summit Declaration and suggested the inclusion of a specific reference about education curriculum at all levels and developing life learning programmes for professionals.