

UN Conference on Sustainable Development (Rio+20)

International Council for Science (ICSU)

in its capacity as co-organising partner of the Scientific and Technological Community Major Group

Input for Rio+20 Compilation Document

Part 1: Priority Recommendations

Securing renewed political commitment – and a new contract between science and society

- New scientific evidence, including work on “planetary boundaries”, reaffirms that humanity has reached a point in history at which a prerequisite for human development – the functioning of the Earth system as we know it – is at risk. Current economic patterns are responsible for many of the interlinked and growing social, environmental and economic crises facing the planet. **The Rio+20 outcome must be commensurate with the urgent need to move humanity to a sustainable path of development. It must reflect a recognition of our planetary boundaries. Poverty eradication, human wellbeing, economic prosperity, social equity and environmental sustainability must be addressed in an integrated fashion.**
(see policy brief on Interconnected risks and solutions – www.icsu.org/rio20/policy-briefs).
- **The Rio+20 conference should decide to launch a process to develop a new contract between science and society to deliver the knowledge necessary for a sustainable future.** There should be a better exchange and application of existing knowledge and technology towards solutions, and support for globally coordinated research initiatives on sustainable development challenges, as well as technological innovation. Commitments in the Rio+20 outcome to significantly increased large-scale investments in targeted science (natural, social, economic, health and engineering sciences and humanities), technology and innovation for sustainable development will be a crucial element to progress.

Assessing gaps in implementation – in the light of new scientific evidence

- Implementation in many sustainable development areas has been woefully insufficient. Recognizing our planetary boundaries, policy makers need to fulfill the commitment to ‘precautionary’ policy as laid out in Agenda 21. Long term catastrophic risk must be balanced against short term economic implications. There is enough scientific evidence to call for immediate urgent action on climate change and other global environmental risks. Remaining gaps in knowledge cannot be taken as a reason to stall on making strong policies for sustainable development.
- There is a need to strengthen Principle 10 on public participation and access to data and information, through the development of regionally and nationally appropriate mechanisms following the model of the Aarhus convention on access to information, public participation and access to justice in environmental matters.

Green economy in the context of poverty eradication and sustainable development

- Food, water, energy, resource and economic development needs should be addressed through a greening of all economic sectors. Create green economies based on 'inclusive wealth', which includes all forms of capital – natural, social and human as well as financial and manufactured – and in which intergenerational wellbeing increases over time.
- Unprecedented challenges require novel, innovative responses. Rio+20 must call for incentives and much enhanced public-private funding needed to strengthen national and international systems for technology, policy, economic and social innovation to achieve sustainable development, and for novel transdisciplinary research programmes in this context.
- New scientifically sound integrated indicators should be developed to monitor progress towards sustainable development and a green economy, taking into account human wellbeing, social equity and environmental sustainability, as well as economic development.
- Targeted capacity building in science (natural, social and economic sciences) and technology, including support to developing countries and attention to gender issues, will be crucial in a move towards sustainable development and a green economy.
- Unsustainable interlinked patterns of consumption, production and resource exploitation in industrialized countries and in some parts of the emerging countries should receive special attention in any road map to a green economy. Targeted policies and programmes to fundamentally reorient these patterns need to create synergies between government regulatory action and mobilizing civil society and business and industry alike.

(see policy briefs on Green Economy and Human Wellbeing – www.icsu.org/rio20/policy-briefs).

Institutional Framework for Sustainable Development

- We urge decision makers to seize the opportunity of Rio+20 to develop a clear and ambitious roadmap for institutional change at all levels and bring about fundamental reform of current sustainable development and environmental governance within the next decade.
- Policies and decision making should be based on the best available natural science, social science, economic science and technology and they must benefit from scientific advances and technological, economic and social innovation. Efforts to improve the institutional framework for sustainable development at all levels, and international environmental governance institutions, must therefore include strengthening of science-policy links, and strengthening the science-base within all institutions.
- Proposals should be explored for international multistakeholder technology assessment mechanisms to evaluate the potential environmental, health, social and economic impacts of existing and new and emerging technologies, based on the precautionary principle.

(see policy brief on Transforming Governance and Institutions – www.icsu.org/rio20/policy-briefs).

New and emerging challenges

- Concerted, global and immediate action is needed to reduce the risk of fundamentally disrupting the stability of the Earth system, with consequences for global economic and political systems. Actions to enhance the resilience and decrease the vulnerability of human communities are also urgently needed. This must be accompanied by concerted global and enhanced action aimed at bridging the development gap between North and South and eradicating poverty, taking into account a growing world population.
- Specific topical priorities which require urgent action include climate change, food security, water security, energy security, biodiversity loss, disaster risk reduction, and sustainable consumption and production patterns, with an overarching goal of human wellbeing, social equity and environmental and economic sustainability.
- Other immediate challenges to be addressed include: ocean acidification, pollution and overfishing; disruption of the nitrogen and phosphorus cycles; global chemical pollution; deforestation; and megacities and urbanization; all of which need action based on the latest science and technology, coordinated targeted observations and research, and improved governance.
- Addressing human health needs and concerns should generally be among the priority actions towards sustainable development and poverty eradication. It should also be central in addressing most if not all new and emerging challenges identified above. The increasing global mobility of people, animals and goods, as well as global warming, is leading to new disease risks in countries and regions where these diseases did not occur before.

(see the series of 9 policy briefs: www.icsu.org/rio20/policy-briefs)

Climate change:

- The immediate priority is to stabilize the global climate at a temperature of no more than 2°C above pre-industrial levels. We must reduce the carbon intensity of the global economy, undertake a massive decarbonisation of the energy sector, and effectively manage Earth's carbon and radiant energy budgets. Strategies for adaptation will also become increasingly important.

Food security:

- The planet needs to feed an estimated 9 billion people by 2050. There will be a need for a knowledge-based focus on enhancing sustainable production and productivity: increasing yields while minimizing environmental footprints, and greatly reducing waste at all stages of the food chain.

Water security:

- An expanding population, growing economies and poor water management are putting unprecedented pressure on our freshwater resources. We simply cannot continue to use water as wastefully as we have in the past. We have to turn to a knowledge-based approach to water conservation and management, in which we evaluate our needs, prioritise allocations, and greatly reduce waste.

Biodiversity and ecosystem services:

- Current trends in biodiversity and ecosystem services are sharply and dangerously negative. We must incorporate the multiple values of biodiversity and ecosystem services into policy and

management decisions, and reduce inequities in access to the benefits derived from biodiversity and ecosystem services.

Energy for all:

- Efforts to provide energy for all should be based on the development and deployment of clean energy technologies focusing in particular on technologies for energy efficiency and conservation, as well as on advanced renewable energy systems. In this context, R&D and investment in renewable and alternative sources of energy should be significantly stepped up; including feed-in-tariffs to incentivise investment in renewable energy. There is also a need to develop strategies for achieving greater energy efficiency in all sectors, notably the construction and transport sectors.

Disaster risk reduction:

- The world faces an increasing loss of human lives, livelihoods and economic assets due to natural and human induced disasters. There is an intrinsic relationship between disaster risk reduction, sustainable development and poverty eradication. An urgent priority is to strengthen significantly disaster preparedness using knowledge, innovation and education for effective response at all levels.

Sustainable consumption:

- Unsustainable consumption patterns in industrialized countries and in some parts of the emerging and developing economies are one of the main factors putting increasing pressure on the planet's social, economic and environmental systems. This requires special and urgent action. Solutions should be considered throughout efforts to move towards a green economy and sustainable development. Practical action, including awareness raising and education, should be underpinned by appropriate knowledge and transdisciplinary research across the multidimensional factors of economics, waste and environment, human behaviour, and lifestyle.

These recommendations are taken from work by the worldwide international scientific community for Rio+20, particularly a series of ICSU-UNESCO regional science and technology workshops in the five UN geo-political regions (see: www.icsu.org/rio20/regional-workshops) and a series of nine policy briefs prepared specifically for Rio+20 (see: www.icsu.org/rio20/policy-briefs) in the context of the Planet Under Pressure science and policy conference (London, 26-29 March 2012). The recommendations also draw on consultations with the constituencies of the scientific and technological community spanning all relevant disciplines in the natural, social, economic, engineering and health sciences, in cooperation with the International Social Science Council (ISSC), the World Federation of Engineering Organization (WFEO), UNESCO, WMO, UNEP and UNU. For further information and recommendations from a disciplinary perspective see submissions for Rio+20 by ICSU's Scientific Union Members (www.icsu.org/rio20/icsu-members).

Part 2 provides more detailed recommendations, further background information and links to relevant sources.

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Part 2: Expanded and more detailed recommendations

Interconnected risks and solutions

For stated policy objectives on sustainable development to succeed, societies can no longer view the global economic system and the political systems that shape it in isolation from the Earth system. Economic development and global governance must value natural capital and respect boundaries in the Earth system, while ensuring equitable and just resource use. **The time has arrived for people to become planetary stewards.**

The urgent global risks and challenges facing all nations are interconnected: poverty alleviation; the financial crisis; economic development; political stability; pollution; food, water and energy security; health; wellbeing; climate change; ocean acidification; and loss of biodiversity, to name just some. Understanding this interconnectedness is crucial for tackling these challenges and improving the wellbeing of all societies.

The path forward hinges on an interconnected approach to policy and a rapid response. Political recognition and acceptance of the scale of the challenges has led to wide ranging efforts to solve them. Real progress has been made in reducing poverty, tackling HIV and protecting the ozone layer, for example. But political processes have had limited success in many other areas, **prompting calls for a fundamental transformation of the global economic and governance model to make it fit for 21st-century challenges** (see policy brief on Interconnected Risks and Solutions – www.icsu.org/rio20/policy-briefs).

Securing renewed political commitment – and a new contract between science and society

- New scientific evidence, including work on “planetary boundaries”, reaffirms that humanity has reached a point in history at which a prerequisite for human development – the functioning of the Earth system as we know it – is at risk. Human induced global environmental change, including climate change, is occurring at an increasing rate and intensity. **The Rio+20 outcome must be commensurate with the urgent need to move humanity to a sustainable path of development. It must reflect a recognition of our planetary boundaries.** (see policy brief on Interconnected Risks and Solutions – www.icsu.org/rio20/policy-briefs).
- Current economic patterns are responsible for many of the interlinked and growing social, environmental and economic crises facing the planet. **Poverty eradication, human wellbeing, economic prosperity and environmental sustainability must become part of the integrated vision and practice of sustainable development.**

- **The Rio+20 conference should decide to launch a process to develop a new contract between science and society to deliver the knowledge necessary for a sustainable future.**
- There should be a better exchange and application of existing knowledge and technology towards solutions and support for globally coordinated transdisciplinary (natural, social, economic, humanities, health and engineering sciences) research initiatives on sustainable development challenges.
- Commitments in the Rio+20 outcome to significantly increased large-scale public and private investments in targeted science, technology, and innovation for sustainable development will be a crucial element to progress.
- The contract between science and society must include a focus on poverty eradication and bridging the development gap between the North and the South. It must pay particular attention to women, vulnerable communities and indigenous peoples and their traditional knowledge.

Assessing gaps in implementation – in the light of new scientific evidence

- Implementation in many areas of sustainable development has been woefully insufficient. Recognizing our planetary boundaries, policy makers need to fulfill the commitment to 'precautionary' policy as laid out in Agenda 21. Long term catastrophic risk must be balanced against short term economic implications. There is enough scientific evidence to call for immediate urgent action, and remaining scientific uncertainties cannot be taken as a reason to stall on making strong policies for sustainable development.
- There is a need to strengthen Principle 10 on public participation and access to information, through the development of regionally and nationally appropriate mechanisms following the model of the Aarhus convention on access to information, public participation and access to justice in environmental matters.

Green economy in the context of poverty eradication and sustainable development:

- A 'Green Economy' is one of the necessary implementation tools for sustainable development, but is not a panacea, and it does not replace the goal of sustainable development.
- Food, water, energy resource, and development needs should be addressed through a greening of all economic sectors. Create green economies based on 'inclusive wealth', which includes all forms of capital – natural, social and human as well as financial and manufactured – and in which intergenerational wellbeing increases over time.
- Unprecedented challenges require novel, innovative responses. Rio+20 must call for incentives and much enhanced public-private funding needed to strengthen national and international systems for technology, policy, economic and social innovation to achieve sustainable development.
- Support is needed for novel transdisciplinary research programmes (with collaboration between the natural sciences, social sciences, humanities and technological community), which address the integrated economic, social and environmental pillars of sustainable development and a green economy. Significantly enhanced targeted funding will provide direction, momentum and coordination to global, regional and national research efforts.

- Unsustainable interlinked patterns of consumption, production and resource exploitation in industrialized countries and in some parts of the emerging countries should receive special attention in any road map to a green economy. Targeted policies and programmes to fundamentally reorient these patterns need to create synergies between government regulatory action and mobilizing civil society and business and industry alike.
- New scientifically sound integrated indicators should be developed to monitor progress towards sustainable development and a green economy, taking into account human wellbeing, social equity, and environmental sustainability, as well as economic factors.
- Targeted capacity building in science (natural, social and economic sciences) and technology, including assistance to developing countries and a focus on gender issues, will be crucial in a move towards sustainable development and a green economy.

(see policy briefs on Green Economy and Human Wellbeing – www.icsu.org/rio20/policy-briefs).

Institutional Framework for Sustainable Development

- We have to reorient and restructure our national and international institutions and governance mechanisms related to sustainable development, including environmental governance. Incrementalism will not suffice to bring about societal change at the level required; the world needs structural change in global governance.
- We urge decision makers to seize the opportunity of Rio+20 to develop a clear and ambitious roadmap for institutional change at all levels and bring about fundamental reform of current sustainable development and environmental governance within the next decade.
- Stronger consultative rights for civil society representatives in intergovernmental institutions should be introduced.
- Policies and decision making should be based on the best available natural science, social science and technology and they must benefit from scientific advances and technological, economic and social innovation. Efforts to improve the institutional framework for sustainable development at all levels, and international environmental governance institutions, must therefore include strengthening of science-policy links, and strengthening the science-base within all institutions.
- Mechanisms such as the IPCC and IPBES are examples of good practice, but further innovation and research in the area of science-policy linkages is required.
- Proposals should be explored for international multistakeholder technology assessment mechanisms to evaluate the potential environmental, health, social and economic impacts of existing and new and emerging technologies, based on the precautionary principle.
- To better integrate sustainable development policies within the UN system, governments need to support overall integrative mechanisms within the UN system that better align the social, economic and environmental pillars of sustainable development.
- In order to strengthen national governance, other policy instruments can complement regulation if they are carefully designed. But they are not panaceas.

- International economic institutions must advance transitions to a sustainable economy, including by multilaterally harmonized systems that allow for discriminating between products on the basis of production processes, based on multilateral agreement. Global trade and investment regimes must be embedded in a normative context of social, developmental, and environmental values.
- In order to fill regulatory gaps in international sustainability governance, new or strengthened international regulatory frameworks are needed in several areas, including on emerging technologies, water, food, and energy.
- Public–private governance networks and partnerships should be streamlined and strengthened. However, there is still a strong need for effective and decisive governmental action.

(see policy brief on Transforming Governance and Institutions – www.icsu.org/rio20/policy-briefs).

New and emerging challenges

- Concerted, global and immediate action is needed to reduce the risk of fundamentally disrupting the stability of the Earth system, with consequences for global economic and political systems. Actions to enhance the resilience and decrease the vulnerability of human communities are also urgently needed. This must be accompanied by concerted global and enhanced action aimed at bridging the development gap between North and South and eradicating poverty, taking into account a growing world population.
- Specific topical priorities which require urgent action include climate change, food security, water security, energy security, biodiversity loss, disaster risk reduction, and sustainable consumption and production patterns, with an overarching goal of human wellbeing and environmental and economic sustainability.
- Other immediate challenges to be addressed include: ocean acidification, pollution and overfishing; disruption of the nitrogen and phosphorus cycles; global chemical pollution; deforestation; and megacities and urbanization; all of which need action based on the latest science and technology, coordinated targeted observations and research, and improved governance.
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(see the series of 9 Rio+20 policy briefs – www.icsu.org/rio20/policy-briefs).

Climate change:

- The immediate priority is to stabilize the global climate at a temperature of no more than 2°C above pre-industrial levels. We must reduce the carbon intensity of the global economy, undertake a massive decarbonisation of the energy sector, and effectively manage Earth's carbon and radiant energy budgets.
- As climate change is already occurring, action is needed by all countries to design and implement strategies to adapt to the consequences of climate change and to limit its socio-economic costs for societies worldwide, with a particular focus on the most vulnerable regions, nations and socio-economic groups. Participation of a broad range of stakeholders will be essential in this undertaking.
- Action is also critical in the domain of science. We must continue to improve our understanding of the climate and Earth system, to refine our predictive tools and reduce uncertainties in projections of future climate and its impacts, particularly at the regional level. Social science research into adaptation and good governance will also be crucial.

Water security:

- Water security is vital to all social and economic sectors as well as the natural resource base on which the world depends. But an expanding population, growing economies and poor water management are putting unprecedented pressure on our freshwater resources.
- We simply cannot continue to use water as wastefully as we have in the past; we have to change the way we manage our water resources.
- Scientists and policy makers have a joint responsibility to work together in the development of more sustainable solutions to existing and emerging water problems.
- Water must be given the prominence it deserves on the global agenda
- Human and environmental water needs must be balanced to safeguard biodiversity and ecosystem services. Unavoidable compromises should be mediated by science rather than lobbies.
- Water security has multiple dimensions, including social, humanitarian, economic and ecological. Major decisions on water resource management must be made therefore with broad cross-sectoral input.
- There is a need to improve the availability of data and information, particularly on transboundary water resources and planetary thresholds. We need to evaluate our water needs and prioritize allocations.
- There is a need to introduce and implement strong policy and legal frameworks (i.e. water laws).
- Proper finance mechanisms are required to ensure sustainability of water services, while capacity building is required at all levels.

(see policy brief on Water Security – www.icsu.org/rio20/policy-briefs).

Food security:

- The planet needs to feed an estimated 9 billion people by 2050. There will be a need for a knowledge-based focus on enhancing sustainable production and productivity: increasing yields while minimizing environmental footprints.
- Waste reduction at all stages of the food system (post harvest losses, transport, storage) and resolving distribution issues is also essential, as this would provide much of the extra food needed for a growing population.

- A strong foundation of multi-lateral and cooperative mechanisms that work across disciplines, sectors and national boundaries needs to be put in place. Institutions operating effectively at multiple levels will be at the centre of sustainable food systems; these will need to be flexible, promote appropriate use of innovative technologies and policies, and recognize the increasingly important role of non-state actors in enhancing food systems.
- As the greatest proportion of the world's poor are small-scale farmers, agriculture must also be a key focus for poverty eradication.
- Investment is needed in training, knowledge sharing and extension services for farmers at all scales.
- Greater involvement of farmers, including small holders and big agro business, in planning and decision making is needed.
- Research is needed for multiscale, multi-level analyses of the dynamic linkages between food security, environmental concerns and development issues.
- A food systems approach is recommended. This links the activities of producing, processing, retailing and consuming food with the outcomes of these activities for food security and other societal goals, showing how food insecurity arises and also providing a framework for policy development to meet the food security challenge.
- A transition to healthier diets as societies grow richer is needed to reduce both environmental and public health burdens.
- Food trade needs to be enhanced to encourage secure access to nutritious food for the poorest and most vulnerable.
- There is an urgent need to develop technologies and policies that will result in sustainable production practices.
- Above all, there is need for a strong focus on resilience, equity and sustainability.

(see policy brief on Food Security – www.icsu.org/rio20/policy-briefs).

Biodiversity and ecosystem services:

- We share this planet with millions of other species and varieties of life, and depend on ecosystems for all our basic needs. While current trends in biodiversity and ecosystem services are sharply and dangerously negative, the right actions, developed and implemented promptly, can restore a biologically rich and ecologically viable planet.
- The multiple values of biodiversity and ecosystem services should be incorporated into policy and management decisions.
- Green economies should be created based on 'inclusive wealth', which includes all forms of capital – natural, social and human as well as financial and manufactured – and in which intergenerational wellbeing increases over time.
- Biodiversity and ecosystem services should be incorporated into water and land-use planning at all scales from local to global, including both protected areas and production landscapes and seascapes.
- Policies and practices should be implemented that reduce inequities in access to the benefits derived from biodiversity and ecosystem services, and ensure that those who bear the cost of their provision are fairly compensated.
- Ecosystem governance and management should be restructured to recognize that ecosystems transcend political boundaries.
- Global governance institutions should be developed that work in partnership with national institutions, local organizations and the private sector, to address global-scale drivers of biodiversity change.
- The Strategic Plan for Biodiversity 2011–2020 and the Aichi Targets should be implemented at all scales.

- The important contributions played by the planet's forests and oceans should be recognised and terrestrial and marine ecosystems should be linked in policy planning.
- Indigenous peoples and their knowledge should be involved in biodiversity research and in the development of conservation strategies and plans.

(see policy brief on Biodiversity and Ecosystems – www.icsu.org/rio20/policy-briefs).

Energy for all:

- There is no uniform solution for making low-emissions sustainable energy available globally, including for more than one billion people without access to modern energy services. Decisions regarding the use of any given energy technology must be based upon thorough analyses of technological and economic feasibility, diverse energy needs, as well as analyses of long-term sustainability and compatibility with the goals of climate stability, environmental protection, social equity, and personal health and safety.
- The optimal energy mix for any particular country and sector will depend upon the natural resource base, trade access to energy sources and socio-economic context.
- Efforts to further develop and deploy energy technologies must focus in particular on technologies for energy efficiency and conservation, as well as on advanced renewable energy systems.
- In this context, R&D and investment in renewable and alternative sources of energy should be significantly stepped up; including feed-in-tariffs to incentivise investment in renewable energy.
- There is a need to develop strategies for achieving greater energy efficiency in all sectors, notably the construction and transport sectors.
- In the transportation sector, urgently needed actions include diversification of engine fuels, increased use of low-emissions vehicles, and a strong emphasis on urban mass transit. Enhancing support for R&D in this sector will be essential.

(see policy brief on Energy Sustainability: www.icsu.org/rio20/policy-briefs).

Disaster risk reduction:

- The world faces an increasing loss of human lives, livelihoods and economic assets due to natural and human induced disasters. There is an intrinsic relationship between disaster risk reduction, sustainable development and poverty eradication. An urgent priority is to strengthen significantly disaster preparedness using knowledge, innovation and education for effective response at all levels.
- Integrated natural and social sciences research should be developed, including improved methods for predictive multi-risk assessment and socioeconomic cost-benefit analysis of risk reduction action at all levels. The technical and scientific capacity to develop and apply methodologies, studies and models to assess vulnerabilities to and the impacts of hazards should also be strengthened.
- The resilience of nations and communities to disasters should be enhanced through people-centred approaches to the entire disaster risk cycle, including prevention, preparedness and emergency response as well as recovery and rehabilitation.

Sustainable consumption:

- Unsustainable consumption patterns in industrialized countries and in some parts of the emerging and developing economies are one of the main factors putting increasing pressure on the planet's social, economic and environmental systems.

- Addressing this problem requires urgent action, and this should be considered throughout efforts to move towards a green economy and sustainable development.
- Practical action, including awareness raising and education, should be underpinned by appropriate knowledge and transdisciplinary research across the multidimensional factors of economics, waste and environment, human behaviour, and lifestyle.
- Communication of clear messages to the public on sustainable consumption and waste reduction will be key, as will clear strategies for public action.

(see policy brief on Human Wellbeing: www.icsu.org/rio20/policy-briefs).

These recommendations are taken from work by the worldwide international scientific community for Rio+20, particularly a series of ICSU-UNESCO regional science and technology workshops in the five UN geo-political regions (see: www.icsu.org/rio20/regional-workshops) and a series of nine policy briefs prepared specifically for Rio+20 (see: www.icsu.org/rio20/policy-briefs) in the context of the Planet Under Pressure science and policy conference (London, 26-29 March 2012). The recommendations also draw on consultations with the constituencies of the scientific and technological community spanning all relevant disciplines in the natural, social, economic, engineering and health sciences, in cooperation with the International Social Science Council (ISSC), the World Federation of Engineering Organization (WFEO), UNESCO, WMO, UNEP and UNU. For further information and recommendations from a disciplinary perspective see submissions for Rio+20 by ICSU's Scientific Union Members (www.icsu.org/rio20/icsu-members).