



United Nations  
Educational, Scientific and  
Cultural Organization



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# Sustainability Science to Eradicate Poverty and Transform Economies through Sustainable Development

## 1. What is Sustainability Science?

Sustainable solutions, whether at the global, regional or country level, require creativity, new advances in scientific knowledge, discoveries and innovations. Sustainability science promotes problem driven cross-disciplinary approaches to advance understanding of human-environment interactions and systems, and of how those interactions affect the challenge of sustainability. The field is defined by the problems it addresses rather than the disciplines it employs. It draws from multiple disciplines of the natural, social, medical and engineering sciences, from the professions, and from practical field experience in business, government, and civil society. Sustainability science approaches are characterized by:

- Use of problem-driven methodologies promoting dialogue between science and society
- A focus on the interactions between social and natural systems
- Integration of multiple forms of knowledge leading to sound policy

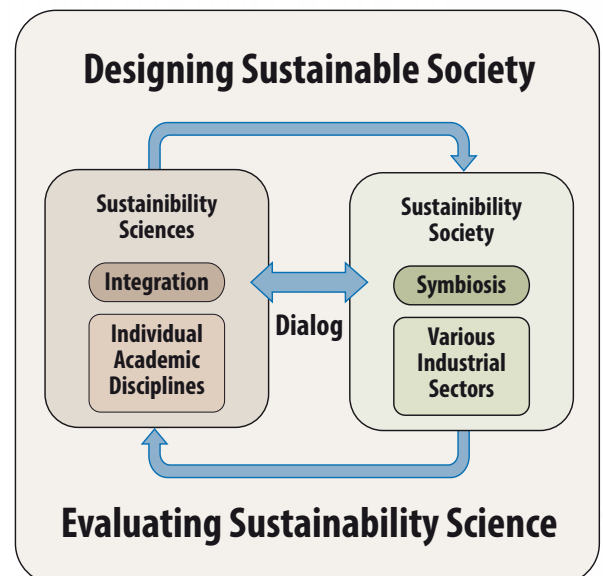
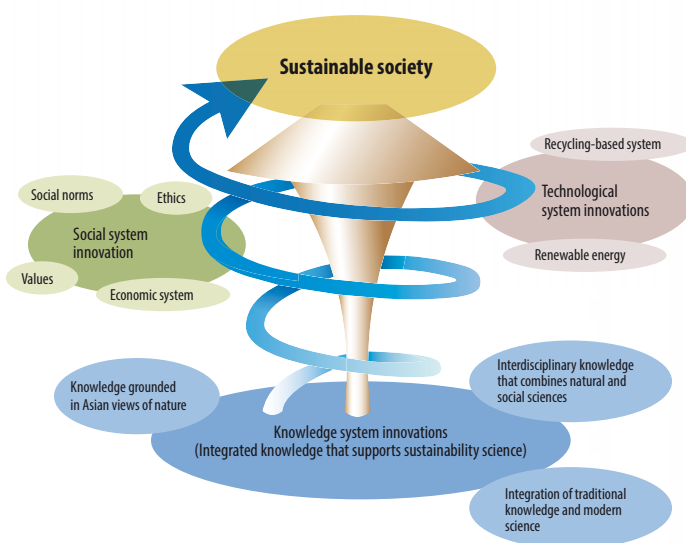


Figure 1. Sustainability Science Approach & Sustainability Science Community

## 2. Sustainability Science & Post-2015 Agenda

The upcoming transition from the MDG era to a new Post-2015 agenda In 2013, presents a once-in-a-generation chance to fundamentally change global economy towards a “Green Economy” – to build a knowledge economy and a knowledge society by mobilizing Science, Technology and Innovation (STI). The Post-2015 Agenda must address the big questions of our time - questions about eradicating poverty, enhancing food security, promoting sustainable energy, managing water and environmental resources, controlling disease, mitigating natural and man-induced disasters, and fostering sustainable cities. The development of solutions to these global challenges needs to be science based.

At the Rio+20 United Nations conference, the world’s governments agreed to produce a set of sustainable development goals (SDGs). The Rio+20 outcome document proposes that the SDGs must be “action-oriented, concise and easy to communicate, limited in number, aspirational, global in nature and universally applicable to all countries while taking into account different national realities, capacities and levels of development and respecting national policies and priorities”. As consumption accelerates and the world population rises, global sustainability becomes an urgent challenge that needs to be dealt with now. Sustainability science is a vital part of the solutions to the sustainability challenges we face . The scientific community now needs to strengthen further international collaboration, and take a leading role in providing the knowledge needed for societal transformations to a sustainable world.

In May 2013, the High-level Panel, established to advise the UN Secretary General on the global development framework beyond 2015, presented its report, including a set of illustrative SDGs:

1. *End poverty*
2. *Empower girls and women and achieve gender equality*
3. *Provide quality education and lifelong learning*
4. *Ensure healthy lives*
5. *Ensure food security and good nutrition*
6. *Achieve universal access to water and sanitation*
7. *Secure sustainable energy*
8. *Create jobs, sustainable livelihoods and equitable growth*
9. *Manage natural resource assets sustainably*
10. *Ensure good governance and effective institutions*
11. *Ensure stable and peaceful societies*
12. *Create a global enabling environment and catalyse long-term finance*

Under Goal 12 “Create a Global Enabling Environment and Catalyse Long-Term Finance” it proposes to “promote collaboration on and access to science, technology, innovation, and development data” . However the challenge remains to lift the role of science both natural and social sciences to develop a thorough understanding of global challenges, to identify, validate and monitor new approaches and technologies and to introduce new green economic models. Sustainability science is a vital part of the solutions to the sustainability challenges we face. The scientific community now needs to strengthen further international collaboration, and take a leading role in providing the knowledge needed for societal transformations to a sustainable world. The challenge remains to lift the role of science, both natural and social, to develop a thorough understanding of the complex global challenges, to identify, validate and monitor new approaches and technologies and to introduce new green economic models.

## 3. Case Studies in Sustainability Science

### 3.1. UNESCO IHP Programme, Hydrology for the Environment, Life and Policy (HELP)

HELP (Hydrology for Environment, Life and Policy) is a cross-cutting initiative (Figure-2) under the International Hydrology Program (IHP) of UNESCO. It is designed to develop policy driven scientific research in the application of integrated water resources management (IWRM) through a global network of catchments to improve the links between hydrology and the needs of society. HELP is field-oriented and is based upon existing and emerging science, bringing together global and local expertise and engaging in scientific capacity building in hydrology and related physical and social sciences, including management and policy. Successful examples of application sustainability science in HELP include triple bottom line approach in water reallocation aimed at enhancing social, economic and environmental outcomes in the Murray Darling Basin, conflict resolution through data sharing and visualization tools in the Davao River Basin in Philippines and linking water quality targets with community learning alliances programs in the Panama Canal region.

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<sup>1</sup>United Nations. The Future We Want (2012); available at <http://go.nature.com/ppewxp>.

<sup>2</sup>Gisbert Glaser, Base sustainable development goals on science. Comment. Nature 35(491)

<sup>3</sup>United Nations (2013) A new global partnership: eradicate poverty and transform economies through sustainable development - The Report of the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda; available at [http://www.un.org/sg/management/pdf/HLP\\_P2015\\_Report.pdf](http://www.un.org/sg/management/pdf/HLP_P2015_Report.pdf)



Figure 2. The HELP Concept of Integrated Water Resource Management (adapted from HELP Panama)

### 3.2. Renewable Energy Technologies in Asia : a Regional Research and Dissemination Programme (RETs in Asia)

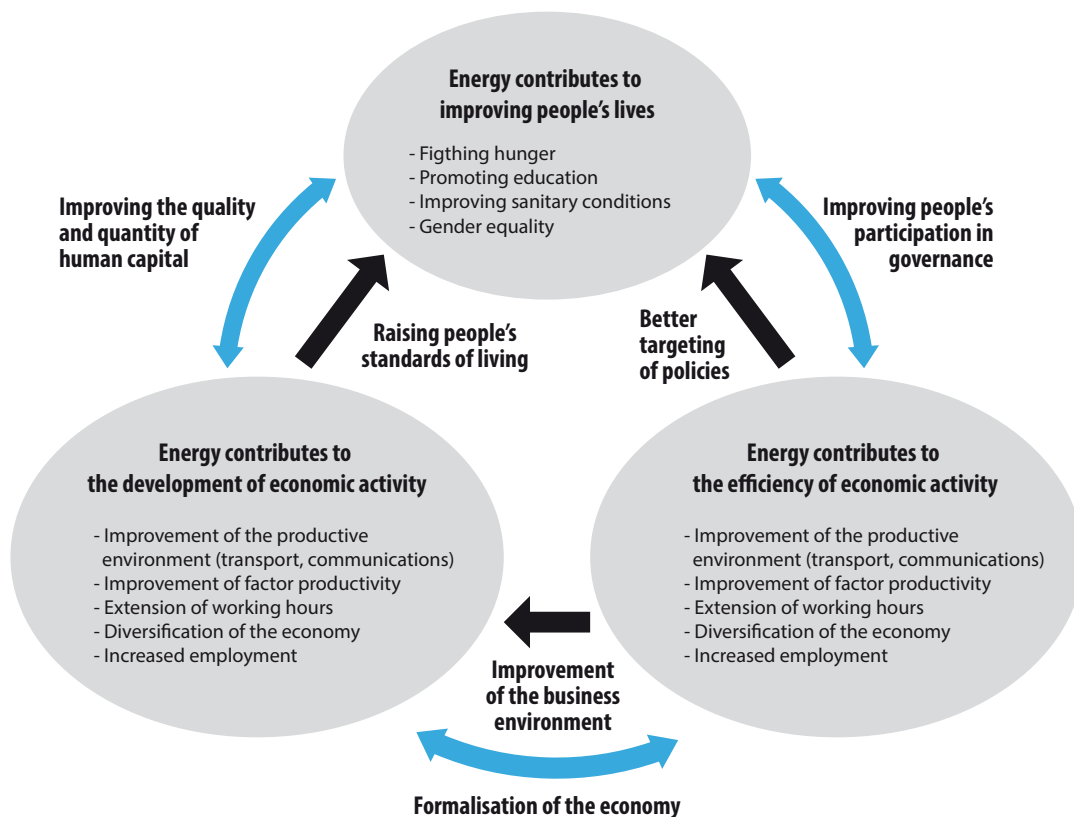


Figure 3. Energy & Sustainable Development

Energy is the golden thread that connects economic growth, increased social equity and preserving the environment through it requires science for sustainable development to underpin it (Figure-3). The relationship between energy and development is particularly important for the poor, as it is linked to basic human requirement and multiple aspects of human development such as poverty, education, and health.

One of energy project contributing to sustainability is Renewable Energy Technologies in Asia: A Regional Research and Dissemination Programme (RETs in Asia). RETs in Asia Programme in Bangladesh aims to develop an energy efficient and cost effective briquetting packages (briquette machine and stove) and build local capacity and fabrication system. This project contributes to environmental, economic, and social sectors including building local capacity and skills, especially for local women, and offering business opportunities for small entrepreneurs in rural area, and reducing the energy consumption/deforestation/residual disposal.

### 3.3. Ecosystem Services for Poverty Alleviation: ESPA Deltas

In 2050, deltas in Mekong, Ganges, and Nile Rivers are expected to be exposed to extreme threat of sea level rise. Ecosystem Services for Poverty Alleviation (ESPA) Deltas approach (Figure-3) tries to find the solution for this challenge by providing policy makers with the knowledge and tools to enable them to evaluate the effects of policy decisions on people's livelihoods.

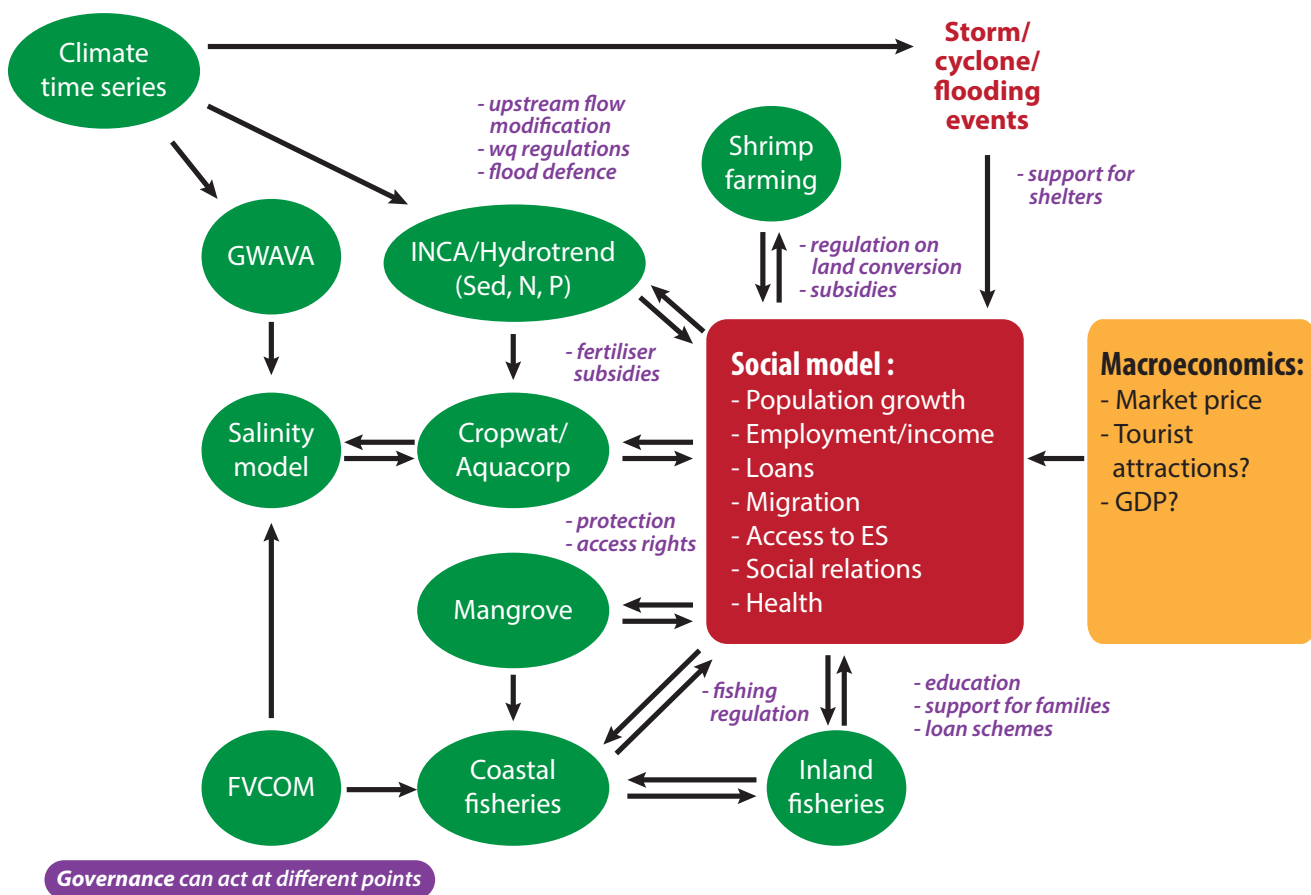


Figure 4. Systems Dynamics Approach: A Dynamic Chain of 'emulators' and 'simulators'

Based on the stakeholder meetings, key issues including bio-physical environment, demographics, macroeconomics, and governance were considered. ESPA Deltas will produce an integrated dynamic model of the current delta front that can be used to enter into an interactive dialogue with by policy makers. Scenarios of plausible futures will be also based upon simulated interventions which address socio-environmental impacts and develop policy sensitivity process. ESPA Delta is a good example of how social and biophysical science integration could offer high quality, relevant information to support policy formulation.

### 3.4. Community Resource Management and Culture in Philippines

Established in 1997, Environmental Science for Social Change (ESSC) is a research organization in the Philippines that promotes environmental sustainability and social justice through the integration of scientific methodologies and social processes. Its mission is to contribute to a critical and holistic understanding of the dynamic relationship between biophysical and social processes in collaboration with partners for the appropriate management of the environment for human development.



Figure 5. Environmental Science for Social Change (ESSC)

ESSC promotes community based natural resource management, evolving from its pioneering work in community resource mapping, especially in areas where indigenous peoples live. ESSC has continuing its work in the Upper Pulangi watershed in northern Bukidnon with the youth in the Pulangiyan community and other upland communities. Current activities include assistance in community planning, design, implementation, monitoring and review, and integration with broader management plans with local government’s land and water use planning. Institutional agreements and budget allocations are also key result areas.

### 3.5. Sustainable Solution for Water Insecurity

Water security involves many sectors and issues – safe drinking water for consumption, sanitation, irrigation for food security and water for industrial activities. Figure 6 shows how a transdisciplinary sustainability science can resolve water insecurity problems using sustainability science. The approach used the problem driven approach to solve water insecurity.

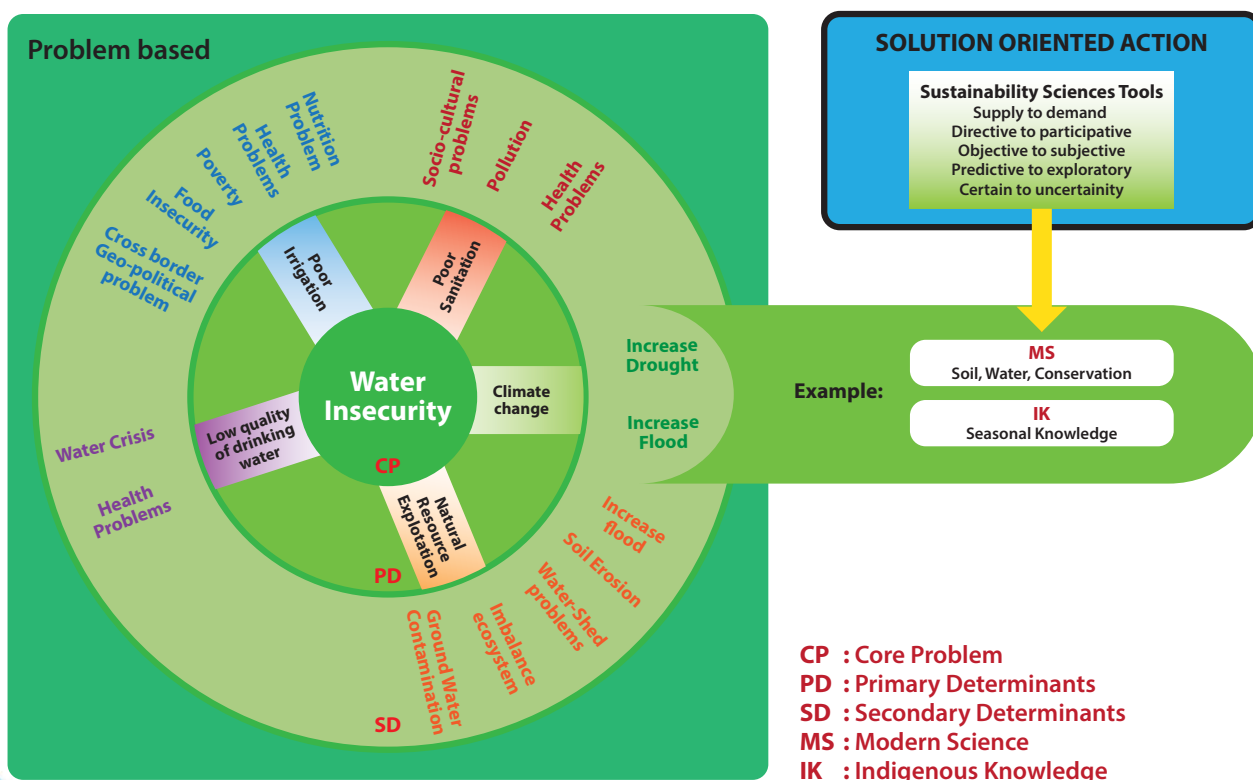


Figure 6. Problem-based Model for Sustainability Science Water Security Solutions

## 4. Delivering Sustainability Science in UNESCO Programme

UNESCO has a unique role to play in strengthening the foundations of lasting peace and sustainable development. It needs to be linked with UNESCO's mid-term strategy from 2014—2021 (37 C/4) in delivering sustainability development solutions at all the levels.

The sustainability science can be delivered through existing UNESCO Networks i.e. International Hydrological Program (IHP), Man and Biosphere Program (MAB) and Management of Social Transformations (MOST) Programme. While IHP and MAB focus on natural science aspects, MOST programme's primary purpose is to transfer relevant Social Sciences research findings and data to decision-makers and other stakeholders.

While there are many dimensions to map the vast work and network initiatives under UNESCO, which has direct or indirect relation to sustainability science, one particular approach can be used to categorise them into initiatives that fall into research and education or capacity building; secondly, institutionalisation of science and its integration to address sustainability; thirdly, promotion of stakeholder collaborations in promoting science and sustainable development. During the international workshop titled "A science based approach to realise the future we want for all", which was held in Kuala Lumpur, Malaysia, from 4-5 April, 2013, the following actions for delivering Sustainability Science through UNESCO were affirmed by the participants:

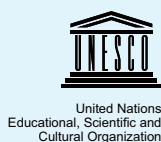
- Complexities and interrelationships of key global challenges require that "Sustainability Science" needs to be implemented through a unified integrated approach between the social and human sciences and the natural sciences. It is recommended to the governing bodies that UNESCO may promote this integrated approach into the next medium-term strategy (C/4) and the programme and budget (C/5).
- UNESCO may make substantial contribution by bringing all the key players together by supporting existing sustainability science networks for sharing of associated tool sets and concepts and a support mechanism for agreed action plans to be implemented with targets and timelines.
- It is recommended to establish pilot demonstration projects for applying sustainability science using existing networks such UNESCO IHP, MAB and MOST. Sustainability demo sites need to be conducive to scientific and social research, including database and case studies, the results of which should be disseminated among all stakeholders for informed decision-making. Learning alliances between sites and universities/research institutes should be fostered to promote working relationships and on-site visits by researchers, professors, and students.
- There is a need to develop human resources by designing modular sustainability science curricula to tackle global challenges through cooperation among various fields. In particular, considering the collaboration and relations with Education for Sustainable Development, implement and accelerate education to foster knowledge and wisdom which makes wiser use of science, cultivated through tradition from primary education levels.
- Decision makers need scientifically credible and independent information to implement sustainable development goals. There may be possibility to establish UNESCO chairs and category-2 centres linked with the developing the sustainability science approach to provide independent and reliable knowledge base and policy advice to international, regional and national stakeholders.

Through a demonstration pilot project, UNESCO is actively working towards integration of the "Sustainability Science" concepts into natural resource management frameworks and processes for supporting opportunities for more sustainable and resilient futures. This project also aims to raise awareness about sustainability science among policymakers in the Asia and Pacific region, with a view to position this as part of the national and regional science and technology policy. This will be achieved by:

- Development of regional knowledge platform, tools and framework to encourage regional research committees to own and manage the research outputs adding to their own local program of activities and also set in place a process that allows this to continue beyond the life of the project;
- Demonstration of the sustainability science approach across selected demonstration projects working closely with natural and social science research disciplines and with the regional committees receiving the research outputs
- Liaise extensively with governments, regional professional bodies, industry associations and regional communities to secure and integrate program outputs that meet research needs and outcomes;
- Establish and encourage where necessary appropriate business arrangements between sustainability science research and regional communities to facilitate positive change for a more resilient environment, prosperous livelihoods and better futures;
- Assist selected regional communities to build their capacity to move to a sustainable and resilient future utilizing sustainability frameworks.

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