Following tradition: Top examples of indigenous knowledge preserving biodiversity, ecosystem service

December 9 2013

Crop diversity: Indigenous communities have always preferred growing a number of traditional crop varieties over a single high-yield -- and high-risk -- mono-cropping system. Analyses of agricultural systems in China, Bolivia and Kenya found maintaining diverse traditional cropping strategies and access to seeds has been essential for adaptation and survival. Credit: US Department of Agriculture / Wikipedia

With the planet losing species 100 to 1,000 times faster than the natural extinction rate, international experts assembling for high-level global biodiversity meetings say knowledge co-production with indigenous peoples has growing importance.

Indeed, they note, processes that merge multiple sources and types of knowledge already help manage challenges as diverse as wildfires and animal herds.

Building synergies between science and traditional knowledge forms one focus of delegates in Antalya, Turkey, December 9 to 14 charged with determining a conceptual framework and initial work program for the UN's new Intergovernmental Platform on Biodiversity and Ecosystem Services.

Modelled on the Intergovernmental Panel on Climate Change (IPCC), the new IPBES is mandated to bridge the gulf between authoritative biodiversity-related information, knowledge, insights and effective policy-making. The organization has 115 member nations.

Available from almost every world region, lessons for ecosystem and natural resource management in indigenous and local knowledge include:

- Rice-fish co-culture, a farming technique for over 1,200 years in south China, was recently designated a "globally-important agricultural heritage system," by the UN Food and Agriculture Organization. A mutually-beneficial relationship has been documented: fish reduce rice pests; rice moderates the fishes' environment, a relationship that reduces by 68% the need for pesticides and by 24% the need for chemical fertilizer compared with monocultures. The findings suggest modern agricultural systems might be improved by exploiting other synergies between species.

- Indigenous fire management techniques developed thousands of years ago, and which today protect large landscapes in Australia, Indonesia, Japan and Venezuela. Early dry season controlled burns create patchy mosaics of burnt country, minimizing destructive late dry season wildfires and maximizing biodiversity protection. In Australia, such projects also create credits sold in carbon markets that support traditional livelihoods.
- Animal herd management in the Arctic, where remote satellite sensing, meteorology and modelling are complemented with the indigenous knowledge of Sami and Nenets reindeer herders to co-produce datasets. The indigenous observers are able to make sense of complex changes in the environment through qualitative assessment of many factors, complementing scientists' quantitative assessment of variables. This holistic approach produces better monitoring and more effective decision-making.
- Agricultural diversity: An important source of resilience for indigenous peoples, who have long and successfully managed the risks and impacts of natural variability and extreme weather. With experience in observing closely and reporting the impacts of changing conditions, indigenous communities have always preferred growing a number of traditional crop varieties over a single high-yield—and high-risk—mono-cropping system. Analyses of three agricultural systems, in China, Bolivia and Kenya, found that maintaining diverse traditional cropping strategies and access to seeds has been essential for adaptation and survival.
- Rotational farming, as practiced in the highlands of Tanzania, illustrates a unique and ingenious farming system involving pits surrounded by four ridges on steep slopes to plant maize, beans and wheat on a rotational basis. During the rainy season, the pits act as reservoirs preventing the destructive effects of surface runoff from the steep cultivated slopes. An elaborate traditional rotational farming system in northern Thailand, meanwhile,

features a complex land use mosaic including a sacred forest, a forest line serving as a firebreak and wildlife path, a transition zone protecting biodiversity habitat, livestock grazing on fallow land, home gardens, rice paddies on terraced slopes and lowland fields, and drought tolerant rice in cleared areas upland.

- Sustainable management of marine resources, as practiced by many Pacific island communities, traditionally involves the use of area and time-based restrictions to facilitate marine resource recovery. These traditional management systems involve a range of strategies, including tabu areas (sacred sites), species-specific prohibitions, seasonal and area closures to create networks of refuges, gear restrictions, behavioural prohibitions, totemic restrictions and food avoidance – all promoting a balanced approach to resource management.
- Rainwater harvesting, thought to have originated 6,500 years ago and revived in the 1970s when the Alwar district of India's Rajasthan state was declared a 'dark zone'– indicating severe drought and rapid depletion of groundwater. Many traditional rainwater harvesting structures that had fallen into disrepair were refurbished and new ones built, all of which helped replenish the aquifers.

Building synergies between science and indigenous knowledge

At the 2nd plenary session of IPBES in Antalya, delegates will consider recommendations from an international workshop on traditional knowledge held in Tokyo in June.

The report of that meeting, The Contribution of Indigenous and Local Knowledge Systems to IPBES: Building Synergies with Science emphasizes that the IPBES conceptual framework must accommodate

indigenous and local knowledge and world views in an appropriate, respectful manner.

The expert group emphasizes that indigenous peoples' and communities' conceptualization of relationships between life's ecological, social and spiritual spheres is reflected throughout their management and knowledge systems.

These should complement science-based representations and form an integral part of the IPBES conceptual framework through "a meaningful and active engagement . . . in all relevant aspects of its work and across all of its functions."

Says the founding Chair of IPBES, Zakri Abdul Hamid: "Our task is complex but essential. We must identify gaps in knowledge and build capacity for the interface between policy and knowledge – in all its forms."

"That means developing a process through which scientific and policy communities recognize, consider and build synergies with indigenous and local knowledge in the conservation and sustainable use of biodiversity and ecosystem services."

The rapid decline of biodiversity and ecosystem services has been called "the 6th great extinction episode" in Earth's history, he notes, and "the role of IPBES is to narrow the gulf between the wealth of scientific knowledge about biodiversity and the paucity of effective action to reverse damaging trends."

Dr. Zakri, a national of Malaysia who co-chaired 2005's landmark Millennium Ecosystem Assessment and serves as science advisor to his country's prime minister, was recently appointed to the UN Secretary-General's Science Advisory Board.

Invasive species, the collapse of bees, and other IPBES work programme priorities

The 2nd plenary meeting of IPBES member nations will approve the 2014-18 work programme, a sequenced and prioritized set of objectives, deliverables, actions and milestones for advancing the organization's four mandated functions:

- Identify and prioritize key scientific information for policymakers and catalyse generation of new knowledge by engaging with key scientific organizations, policymakers and funding organizations;
- Perform regular assessments of knowledge on biodiversity and ecosystem services and their interlinkages;
- Support policy formulation and implementation by identifying and developing relevant tools and methodologies for decision makers; and
- Prioritize capacity-building needs to improve the science-policy interface and then provide and call for financial and other support for the highest-priority needs.

The draft work programme addresses the collapse of bee and other pollinator populations in many parts of the world with a proposed fast-track assessment of pollination and food production to be completed by next March.

This assessment will address trends in pollinators and pollination dynamics, drivers of change, how pollination declines and deficits have affected human well-being and how effective the response has been to date.

The work programme also calls for a global assessment of land degradation and restoration focusing on the effect of degradation on

biodiversity values, ecosystem services and human well-being and the state of knowledge of ecosystem restoration.

Also proposed is a global assessment of invasive alien species and the threats posed to biodiversity, ecosystem services and livelihoods. The plenary may also initiate further thematic assessments on two of the following: agriculture and food security; sustainable use of biodiversity; and migratory and transboundary species.

The IPBES also plans to produce two guides by August 2015 based on fast-track assessments of policy and support tools and methodologies for:

- Scenario analysis and modelling of biodiversity and ecosystem services that will help decision makers to identify and reject development pathways with adverse impacts on human well-being in favour of alternatives that conserve and use biodiversity sustainably; and
- Valuation and accounting of biodiversity and ecosystem services that help decision makers in taking into account the value of biodiversity and ecosystem services and identify trade-offs between various development pathways.

The IPBES plenary will also consider a proposed budget for 2014-18, estimating the total cost of the five-year work programme at roughly $21 - 23 million.

More information: The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES): ipbes.net/about-ipbes.html

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