

## **Indicator(s) on the Health & Well-being of Communities Directly Dependent on Local Ecosystems**

An initiative under the 2010 Biodiversity Indicators Partnership (BIP),  
being carried out by the United Nations Environment Programme World  
Conservation Monitoring Centre (UNEP-WCMC) and the World Health  
Organisation (WHO), with support from the Swedish International  
Biodiversity Programme (SwedBio).

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# Background

## Mandate from the Convention on Biological Diversity

In 2002, the Parties to the Convention on Biological Diversity (CBD) agreed “*to achieve by 2010 a significant reduction of the current rate of biodiversity loss at global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth*”. This ‘2010 biodiversity target’ was adopted by governments at the 6th Conference of the Parties (COP-6) of the CBD (Decision VII/26), was later endorsed at the World Summit on Sustainable Development (WSSD), and has been included in the Millennium Development Goal on environmental sustainability.

An essential part of reaching the 2010 biodiversity target is being able to measure and communicate progress. For this, the 2004 CBD COP-7 adopted a framework which included the use of a range of indicators (Decision VII/30 and SBSTTA X/5). The 2010 Biodiversity Indicators Partnership (BIP) is a global initiative established to further develop and promote indicators for the consistent monitoring and assessment of biodiversity.

An indicator on the health and well-being of communities directly dependent on local ecosystem goods and services was incorporated in Decision VII/30, which is now under the Focal Area: Ecosystem integrity and ecosystem goods and services.

## Aims of the specific indicator

All humans rely on the provisioning, regulating, cultural, and supporting services of ecosystems for survival and well-being (Millennium Ecosystem Assessment (MA), 2005<sup>1</sup>). This project aims to develop indicators of the health and well-being of communities who are directly dependent on local ecosystems. While rich urban individuals also rely on local ecosystems for their survival, the rural poor are likely to bear the greatest burden of ecosystem degradation whilst having the least ability to cope with changes by commandeering goods and services from further afield.

As demonstrated in Figure 1, the impact of changes or impairment of ecosystem services can have direct as well as complex indirect impacts on human health and well-being. While it is recognised that degradation can also have a positive impact on human health and well-being through (for example, higher crop yields resulting from agricultural intensification) the limits and costs associated with ecosystem change are becoming clear. Due to these complex relationships and linkages the project will draw on expertise from a wide range of disciplines, including biodiversity monitoring, human health, and indigenous rights.

This project, funded by SwedBio, complements the activities undertaken by the 2010 Biodiversity Indicators Partnership (BIP)<sup>2</sup>, a global initiative to track progress

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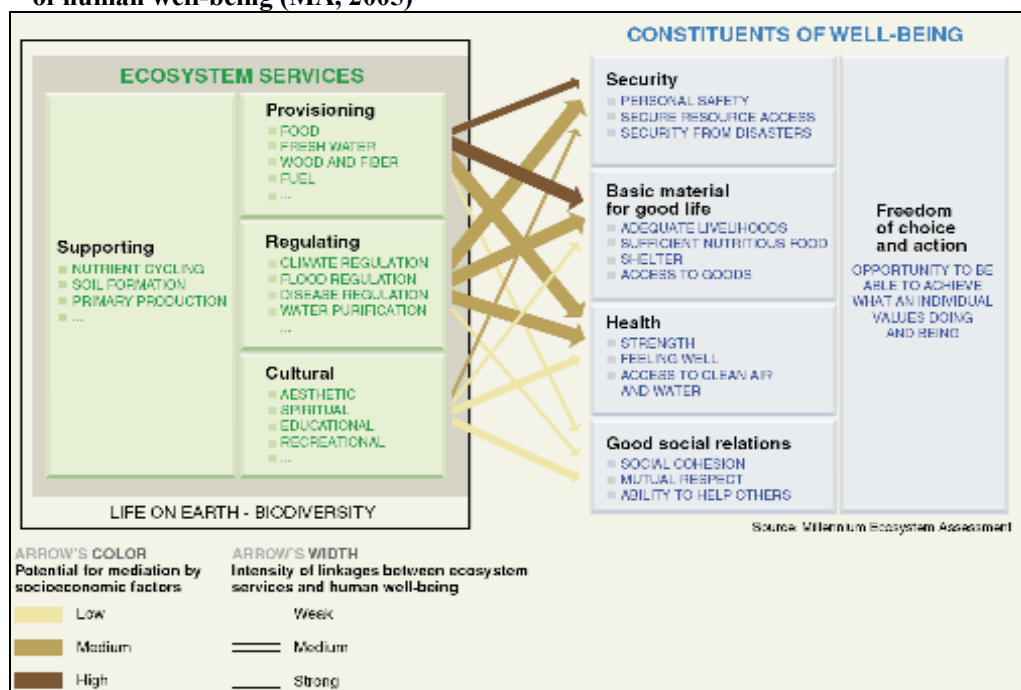
<sup>1</sup> Millennium Ecosystem Assessment (MA). 2005. *Millennium Ecosystem Assessment: Ecosystems and Human Well-Being*. Island Press, Washington, D.C., U.S.A. URL: [www.maweb.org](http://www.maweb.org)

<sup>2</sup> <http://www.twentyten.net/>

towards the “2010 biodiversity target” to significantly reduce the rate of loss of biodiversity by 2010. The project has three main work packages:

- Background review paper of the aspects of health and well-being most critically affected by ecosystem degradation as well as available indicators;
- Workshop to leverage expertise from a wide range of disciplines; and
- Investigate a set of indicators that are informative, feasible, and policy relevant.

**Figure 1 MA framework of linkages between ecosystem services and constituents of human well-being (MA, 2005)**



## Relationship with other 2010 BIP indicators

This indicator has strong potential to incorporate the messages of a number of the other indicators being developed as part of the 2010 BIP, both within and outside this focal area, and provide a backbone to put the 2010 BIP message across to decision makers in such a way as to maximise potential attention. Collaborations could include 13 of the 27 other indicators currently under development:

- Trends in extent of selected biomes, ecosystems, and habitats
- Living Planet Index
- Red List Index and Sampled Red List Index
- Area of forest under sustainable management: degradation and deforestation
- Area of agricultural ecosystems under sustainable management
- Proportion of products derived from sustainable sources
- Proportion of fish stocks in safe biological limits
- Status of species in trade
- Wild Commodities Index
- Water quality
- Nutritional status of biodiversity

- Biodiversity for food and medicine
- Status and trends of linguistic diversity and numbers of speakers of indigenous languages.

In addition to this, other indicator initiatives should be consulted and collaborated with, where possible. Known initiatives include the International Indigenous Forum on Biodiversity (IIFB) Working Group on Indicators<sup>3</sup>, particularly those related to health and well-being of indigenous and local communities, and the Circumpolar Biodiversity Monitoring Programme (CBMP)<sup>4</sup>.

### **Key milestones in the timeline for development**

There are a number of timelines that are relevant to the development of this indicator:

- *October 2008*: The International Conference on Environment, Forced Migration and Social Vulnerability (EFMSV), organised by United Nations University, will be held in Bonn to examine the environmental aspects of migration and social vulnerability.
- *December 2008*: The EcoHealth Forum in Mérida, Mexico, will be a key opportunity to examine the first stage of development of this indicator by presenting it to the assembled academic and ecohealth communities. The session will also look for further datasets and gather relevant case studies.
- *March & December 2009*: The first draft of inputs into the third edition of the Global Bioersity Outlook (GBO-3) is expected by March 2009. The final draft is requested in December, in time for approval and release on International Day of Biodiversity, 22 May 2010. The GBO-3 is seen as a major communication from the United Nations Environment Programme and the CBD in 2010, and the 2010 BIP is expected to be a major feature therein.
- *2009-2010*: A series of COHAB regional workshops are in planning for 2009 - 2010, with the Third International Conference on Health and Biodiversity due to be held in summer 2010. These would provide good opportunities to discuss the indicator further. Dates and venues are due to be announced in September.
- *June 2010*: The deadline for the current Global Environment Facility-supported project, which is responsible for the development of most of the 2010 BIP suite of indicators, as well as the overarching maintenance of the initiative, is in June 2010. While this indicator will not be expected to report by this deadline, there will be a major communication exercise related to this and this indicator should play a part, where possible.
- *October 2010*: While the deadline for the 2010 biodiversity target is December 2010, the expected date for the tenth meeting of the CBD Conference of the Parties (COP) will be October 2010. By this time, the indicator should be developed, as far as possible, with recommendations submitted to the COP on the best way forward for this indicator. The possibility of a subsequent phase to the 2010 BIP is being discussed and this indicator would need to show potential and requirement for follow-on and extra development to ensure both that it supports the needs for a subsequent phase and is worthy of inclusion in the indicator suite.

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<sup>3</sup> See UNEP/CBD/WG8J/5/8

<sup>4</sup> <http://arcticportal.org/en/caffi/cbmp>

## Description of indicator(s)

### Defining the terms of the indicator title

It was quickly recognised during the Geneva workshop that clear definitions of the terms used in the title of this indicator were necessary. Not only would this allow for full clarity for those involved in the development of this indicator (lead by UNEP-WCMC and WHO), but would also allow for full understanding by both the users of the final indicator and, ultimately, policy makers. Two terms were especially identified as requiring definition: ‘health & well-being’ and ‘directly dependent’.

#### *Health & well-being:*

While it is agreed that these two terms are separate, there is a high level of overlap in the factors that determine both. For instance, in the WHO mandate definition: *Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.*

The concept of well-being itself can be difficult to narrow down. As a highly subjective term, with a large number of both physical and psychological (including cultural) influences, there are inherent difficulties in setting out a fully inclusive definition that would suffice at the global level. For instance, three specific determinants of well-being were identified as applicable for this indicator, but with different degrees for importance depending on the community in focus: Control over the environment and self-determination; control over land and resources; and maintenance of collective identity.

The work carried out by the WHO Field Centre for the Study of Quality of Life, based at the University of Bath, has taken a collaborative approach to defining well-being, acknowledging that there are inherent difficulties in translation and a degree of subjectivity is unavoidable. The use of a cultural filter has been adopted, based around central core aspects with regional ‘add-ons’. The core aspects cover the physical, social, psychological and environmental domains, with currently no embedded biodiversity factor.

It was agreed that the definition as used in the MA was suitable and has been adopted:

*Human well-being has multiple constituents, including basic material for a good life, freedom of choice and action, health, good social relations, and security. Well-being is at the opposite end of a continuum from poverty, which has been defined as a “pronounced deprivation in well-being.” The constituents of well-being, as experienced and perceived by people, are situation-dependent, reflecting local geography, culture, and ecological circumstances. (MA, 2005)*

#### *Directly dependent:*

The final part of the title ‘communities directly dependent on local ecosystem goods and services’ also needed definition, and it was decided that the key element was

‘directly dependent’. Once defined, it was felt that the other terms would be relatively self-explanatory.

It was recognised that, to a degree, everyone is dependent on local ecosystem goods and services, and the indicator should reflect this. However emphasis should be given to show how certain communities are more directly dependent of their ecosystems, and therefore more vulnerable to any alterations or degradations. A weighting system based on level of dependence should therefore be devised. Criteria need to be developed to identify communities who fall into the following suggested super-categories:

1. Absolute dependence – Where all aspects of cultural, sustenance, economic and spiritual requirements are taken directly from the local ecosystem.
2. Sustenance dependent – Where sustenance requirements are only available locally, while other elements, as laid out above, may be sourced externally.
3. Partially sustenance dependent – Where some requirements, as laid out above, are sourced from local ecosystems, but obtaining any additional elements externally is possible.
4. Economically dependent – Local ecosystem services are used primarily for economic gain, and the other elements of health and well-being are purchased from the income generated.
5. Psychologically dependent – Where local ecosystem services are used to increase well-being and some aspects of health. Examples of this would include the use of urban green spaces, urban gardens or other recreational areas, direct access to clean air and water, and long-term dependence on medicinal products.

**Table 1 Millennium Ecosystem Assessment framework**

Ecosystem Service		
Provisioning		
Aspect of well-being	Security	
	Basic material for good life	
	Health	
	Good social relations	
Regulating		
Aspect of well-being	Security	
	Basic material for good life	
	Health	
	Good social relations	
Cultural		
Aspect of well-being	Security	No correlation
	Basic material for good life	Weak correlation
	Health	Medium correlation
	Good social relations	Strong correlation

### Defining the indicator

The MA framework shown in Figure 1 can be depicted in matrix form as in Table 1 providing a useful framework for considering priority areas for indicator

development. Indicators are required that focus on those connections between the ecosystem service and the aspect of human well-being which are strongest and most relevant for communities directly dependent on local ecosystems. The strength of the connections between the ecosystem service and the aspect of human well-being is depicted by differing shades of grey where darker shades show stronger relationships.

Once the key relationships have been identified the next step is to consider which indicators would most effectively and efficiently monitor those relationships. The attributes of a good indicator are summarised in Box 1. The challenge of designing an indicator that possesses all of the characteristics described in Box 1 should not be underestimated. For instance, developing a direct and unambiguous measure of progress is a particular challenge due to the often indirect, deferred, and displaced relationship between ecosystem degradation and human health and well-being. In addition, the often circular and self-perpetuating nature of poverty and ecosystem degradation makes its monitoring and interpretation challenging. For example, land degradation may force people onto more marginal lands, which in turn increases degradation and so the cycle continues.

***Box 1      Features of a good indicator***

A well-developed indicator:

- Is a direct and unambiguous measure of change
- Is relevant, i.e. it measures factors that reflect the goals/objectives of the programme, policy, or project
- Varies across time, area, groups and is sensitive to changes in programmes, policy, or projects
- Is transparent and cannot be manipulated to show achievement where none exists
- Is cost-effective to track

Source: Prennushi, G., Rubio, G. and Subbarao, K. 2002. Monitoring and Evaluation. In: Klugman, J. (ed.) *A Sourcebook for Poverty Reduction Strategies*. World Bank, Washington, D.C., USA.

It is clear that an indicator should be relevant and meet the needs of the monitoring programme. However, achieving this is dependent on the availability of data, the complexity of the relationship being monitored, as well as the cost-effectiveness of the indicator. The issue of relevance is particularly important in this case as many of the relationships of interest will be relevant for a particular community and may not be of relevance beyond this local scale. For example, issues faced by a community dependent on local mangroves will probably not be applicable to communities living inland. In some cases this may cause a conflict between the highly localised nature of the relationship being monitored and relevance at the global scale.

For indicator processes such as monitoring progress towards the 2010 biodiversity target it is necessary that indicators be variable over time, area, or group in order that they may meaningfully inform policy or project decisions. Crucially, the indicator should be sensitive to changes in the status of biodiversity.

To enable a meaningful interpretation of an indicator it is sometimes necessary to provide a comparator. For example, for non-experts, it can be difficult to interpret an indicator of say freshwater resources per capita unless a point of reference is included. This is where a comparator can play a crucial role and may be in the form of a recommended guideline or minimum standard such as from WHO or similar. In other cases, where a recommended standard is not appropriate, a comparator may be provided in the form of a comparison over time, area, or characteristic, such as income group, or ecosystem type.

The ideal indicator should also be transparent and not subject to manipulation. This is crucial if the indicator process is to be trusted by relevant parties. However, an indicator can only be as good as the data on which it is built and therefore it is also necessary for the underlying data to be reliable and robust. In the case of indices or indexes all underlying assumptions and weightings should be made explicit and transparent to ensure that indicators are not misinterpreted or misused.

The proposed indicators must focus on the connections between ecosystem services and human health and well-being which are strongest and most relevant for communities directly dependent on local ecosystems. Indicators will therefore be prioritised by their relevance and data availability. A particular challenge with data availability is that data should relate to the population of interest, i.e. communities directly dependent on local ecosystems.

Once an indicator has been identified, Figure 2 provides a matrix for considering whether it should be considered for use in global monitoring towards 2010. In some cases a trade-off between the “ideal” indicator and those that can be developed with readily available data may be required. For example, where data is not readily available it might be necessary to consider related, indirect indicators. The degree of relevance will also be measured by the sensitivity of the indicator to changes in the status of the ecosystem. Indicators that fit into categories shaded red in Figure 2 should not be considered for inclusion in the final proposed list while those falling into categories shaded green should be. Those shaded yellow may be relevant and could be available for 2010 in a global monitoring exercise.

**Figure 2 Matrix for considering indicator inclusion**

Data availability ↑		Direct	Indirect	Irrelevant	<b>Key</b>
	Available				
	Potentially available				
	Related data available				
	Not available				
					To be proposed
					To be considered/adapted
					To be excluded

Table 2 was initially developed from the suite of indicators for the MA and thoughts based on the known availability of applicable data. It has been laid out to expand on the matrix in Table 1, with a view to further reviewing the key relationships between ecosystems and health & well-being. While used as a starting point for the Geneva workshop, it is still considered a working document.

It is recognised that, while some data are available from existing sources (e.g., infectious disease notification, Demographic and Health Surveys), these would provide an incomplete profile, and many are not available for specific populations. Table 2 highlights areas of data deficiency, based on current knowledge. If variables with these deficiencies are selected for the final indicator, there would be a need for new or more detailed surveys, particularly in sentinel populations. While it is recognised that this would be a time-consuming and expensive exercise, it may be essential for the optimum development of an indicator or a suite of (sub-)indicators on the health and well-being of communities directly dependent on local ecosystem goods & services. Certainly, it was agreed during the Geneva workshop that deficiencies in available necessary datasets should not hinder the development of the indicator, but would act to inform areas for future research.

Finally, it is acknowledged that, while these indicators have been primarily identified for their socio-economic or psychological perspective, some may also be reinterpreted by biome to further identify the conditions of similar, yet geographically distinct communities at a number of scales. For instance, a refinement may be carried out on a number of the variables listed below from a marine perspective, thereby highlighting the condition of coastal communities. Equally, for the global indicator, the same variable listed below may be repeated for separate biomes.

**Table 2 Potential indicators/variables**

Aspect of health & well-being	Justification	Indicator	Applicable potential datasets	Notes	Highest category of dependence	Suitable for further investigation?
Overall demographic	A demographic estimate provides a basis for estimating the proportion of the global population who are directly dependent on ecosystem good & services for their health and well-being, and for monitoring changes in this proportion	% of population directly dependent for their health and well being on biodiversity	?		1	Yes
<b>Provisioning</b>						
<b>Local, culturally-dependent, foods</b>						
Security	Foods bridge gaps in times of hardship such as natural disasters and civil unrest	% of daily required Vitamin A	FAO-held data		1	Yes
		Direct access/proximity to food in times of disaster	?	MA definition: safety of person and possessions, secure access to necessary resources, and security from natural and human-made disasters.	2	Yes
		Availability of/access to seeds with reduced vulnerability to local pests	FAO?		2	Yes
	Higher income from sale of foods increases household resilience to shocks.	FAO dietary diversity score (broad, not always species specific but easily modified); Dietary Energy Supply (from Food Balance Sheets with time series over 40 years); Miscellaneous food consumption and market surveys with greater disaggregation of foods (e.g., 24-hour recalls)	FAO	FAO project “Using Markets to promote the sustainable use of crop genetic resources.*” The above is fundamental in the development on another Nutrition + Biodiversity indicator on consumption. * Pigeon Peas – Kenya; Sorghum and Millet – Mali; Millet – India; Potato – Bolivia	1	Yes
		Time spent accessing foods (by household or community member and season)	Not available		1	Yes
		% household income derived from sale of foods	Not available	Need to ensure no confounding factors	4	Yes
Basic	Foods provide nutritional benefit,	% of local foods in total diet	CINE, McGill		1	Yes

Aspect of health & well-being	Justification	Indicator	Applicable potential datasets	Notes	Highest category of dependence	Suitable for further investigation?
material for good life	and can be sold providing a source of household income resulting in higher investments in household goods and health.		University			
		FAO dietary diversity score (broad, not always species specific but easily modified); Dietary Energy Supply (from Food Balance Sheets with time series over 40 years); Miscellaneous food consumption and market surveys with greater disaggregation of foods (e.g., 24-hour recalls)	FAO	FAO project “Using Markets to promote the sustainable use of crop genetic resources.*” The above is fundamental in the development on another Nutrition + Biodiversity indicator on consumption. * Pigeon Peas – Kenya; Sorghum and Millet – Mali; Millet – India; Potato – Bolivia	2	Yes
		% of land used for cultivation of traditional foods	Bioversity International		2	Yes
		% household income derived from sale of foods	Not available	Need to ensure no confounding factors	4	Yes
	Availability of foods may reduce time burden on women and children. This time burden detracts from time available for other activities (including school attendance).	Time spent accessing foods (by household or community member and season)	Not available		2	Yes
Physical & mental health	Higher household use of foods may improve health through improved diet, or other investment.	% of children suffering from malnutrition at national level (stunting, underweight, wasting)	UNICEF & WHO		1	Yes
		FAO dietary diversity score (broad, not always species specific but easily modified); Dietary Energy Supply (from Food Balance Sheets with time series over 40 years); Miscellaneous food consumption and market surveys with greater disaggregation of foods (e.g., 24-hour recalls)	FAO	FAO project “Using Markets to promote the sustainable use of crop genetic resources.*” The above is fundamental in the development on another Nutrition + Biodiversity indicator on consumption. * Pigeon Peas – Kenya; Sorghum and Millet – Mali;	1	Yes

Aspect of health & well-being	Justification	Indicator	Applicable potential datasets	Notes	Highest category of dependence	Suitable for further investigation?
				Millet – India; Potato – Bolivia		
		% of land used for cultivation of traditional foods	Bioversity International		2	Yes
		% household income derived from sale of foods	Not available	Need to ensure no confounding factors	4	Yes
	Foods enhance diversity and quality of diet helping provide adequate nutrition	% of daily required Vitamin A	FAO		1	Yes
		Number of species of foods eaten weekly	Not available		1	Yes
		% of local foods in total diet	CINE, McGill University	CINE data can be used to calculate % of daily required nutrients from local foods in selected communities	1	Yes
		Time spent accessing foods (by household or community member and season)	Not available		2	Yes
		Exercise and physical outdoor activities by communities	Not available	A case study from the UK is available from the 2001 Health Development Agency newsletter	3	Yes
Good social relations	Money from sale of foods may enhance household income and ability to participate in community activities	FAO dietary diversity score (broad, not always species specific but easily modified); Dietary Energy Supply (from Food Balance Sheets with time series over 40 years); Miscellaneous food consumption and market surveys with greater disaggregation of foods (e.g., 24-hour recalls)	FAO	FAO project “Using Markets to promote the sustainable use of crop genetic resources.*” The above is fundamental in the development on another Nutrition + Biodiversity indicator on consumption. * Pigeon Peas – Kenya; Sorghum and Millet – Mali; Millet – India; Potato – Bolivia	1	Yes
		% household income derived from sale of foods	Not available	Need to ensure no confounding factors	4	Yes
	Management of resources may enhance community structure (or cause conflict)	Time spent accessing foods (by household or community member and season)	Not available		2	Yes
<b>Traditional fuel</b>						

Aspect of health & well-being	Justification	Indicator	Applicable potential datasets	Notes	Highest category of dependence	Suitable for further investigation?
Security	Availability of alternative fuel provides security against shocks	Dependence on traditional fuel (alternatively, dependence on non-traditional fuels) in times of hardship	Not available		2	Yes
Basic material for good life	Sale of traditional fuel can provide household income. Available fuel enables water to be boiled (implies degraded/unsafe water sources), food to be heated through and warmth to reduce the risk of disease and illness	% household income derived from sale of traditional fuel	Not available		4	Yes
	Availability of fuel may reduce time burden on woman and children This time burden detracts from time available for other activities (including school attendance).	Time spent collecting traditional fuel (by household member and season)	Not available		3	Yes
Physical & mental health	Exercise and physical outdoor activities by communities	Quality of Life Indicators	University of Bath		1	Yes
	Available fuel enables water to be boiled (implies degraded/unsafe water sources), food to be heated through and warmth to reduce the risk of disease and illness	% of energy use from traditional fuels per capita	IEA	Not possible to break down by community	3	Yes
	Biomass/fuel use in poorly ventilated household results in acute respiratory infection	ARI prevalence in children under-five (% children)	<a href="http://www.who.int/whosis/indicators/2007ARICildFacility/en/index.html">http://www.who.int/whosis/indicators/2007ARICildFacility/en/index.html</a>		3	Yes
Good social relations	Money from sale of traditional fuel may enhance household income and ability to participate in community activities	% household income derived from sale of traditional fuel	Not available		4	Yes
	Management of resources may enhance community structure (or	Not defined	Not immediately		4	Yes

Aspect of health & well-being	Justification	Indicator	Applicable potential datasets	Notes	Highest category of dependence	Suitable for further investigation?
	cause conflict)		accessible			
<b>Available lands &amp; land use (including land use change<sup>5</sup>)</b>						
Security	Poor are often farming marginal lands where soil is poor and prone to degradation	Number of people displaced by stresses such as soil erosion, water availability,	UNEP-GRID Arendal / IPCC		2	Yes
		Indicator of land ownership and land use change, and related to species richness	?		2	Yes
Basic material for good life	Degradation or destruction of nursery habitats may reduce availability of animal protein	Indicator relating deforestation and broader concept of land use change	?		2	Yes
	Fertilisers, biomass and livestock and human waste burning interferes with nutrient cycling which may impact livelihoods	Number of farmers tending degraded lands in relation to soil type as a function of productivity	?		2	Yes
Physical & mental health	Poor yields (some poor yield crops have high nutritional value and vice versa) may affect nutritional intake with resulting impacts on health and child development	None				No
Good social relations		% of land used for cultivation of traditional foods	Bioversity International		2	Yes
		Indicator on links between land and spiritual/recreational value (including school & home land/gardens)	?		2	Yes
<b>Medicine</b>						
Security						
Basic material for	Traditional medicines offer income opportunities with resulting	% household income derived from sale of traditional medicines	Not available		4	Yes

<sup>5</sup> This was discussed mostly in the context of recognition of security and rights to land, territories and resources to be very important and relevant to well-being and livelihoods of indigenous and local communities.

Aspect of health & well-being	Justification	Indicator	Applicable potential datasets	Notes	Highest category of dependence	Suitable for further investigation?
good life	household benefits	Number of medicinal species sold / used per household or community	Not available		4	Yes
Physical & mental health	Traditional medicines offer health remedies	Number of times traditional medicines used in past month	Not available		3	Yes
Good social relations	Availability of medicinal plants may reduce time burden on woman and children This time burden detracts from time available for other activities (including school attendance).	Time spent (by household or community member) collecting or nurturing traditional medicinal plants	?		3	Yes
	Effective traditional medicines improve health and well-being in the community	Dependence on medicinal and non-medicinal substances (2 facets of quality of life)	Univ. of Bath WHOQOL pilot data from 15 countries worldwide		5	Yes
<b>Other</b>						
Security						
Basic material for good life	Local resources provide building materials for shelter	% community buildings built more than 50% from traditional building materials	Not available		3	Yes
Physical & mental health	Clean available water reduces the risk of disease and illness	Access to an improved drinking water source	<a href="http://www.who.int/whosis/indicators/2007ImprovedAccessWaterSanitation/en/index.html">http://www.who.int/whosis/indicators/2007ImprovedAccessWaterSanitation/en/index.html</a>		2	Yes
		Diarrhoea-related mortality rate among children under five years of age	<a href="http://www.who.int/whosis/indicators/2007MortChild/en/index.html">http://www.who.int/whosis/indicators/2007MortChild/en/index.html</a>		2	Yes
		Percentage/prevalence of children under	<a href="http://www.stat">http://www.stat</a>	The exact terms of this	2	Yes

Aspect of health & well-being	Justification	Indicator	Applicable potential datasets	Notes	Highest category of dependence	Suitable for further investigation?
		three/five years who had diarrhoea in the last two weeks	<a href="http://compiler.com">compiler.com</a>	indicator need to be investigated, depending on data availability		
Good social relations						
<b>Regulating</b>						
<b>Natural hazard regulation</b>						
Security	Deforestation may increase vulnerability to floods and landslides	Frequency of natural disasters	UNEP-GRID Arendal / IPCC / International Committee of the Red Cross	<ul style="list-style-type: none"> <li>UNEP-GRID Arendal Centre for Research on Epidemiology of Natural Disasters</li> <li>The IPCC reports “observed impacts” of climate change, including frequency of natural disasters</li> <li>ICRC’s World Disaster Report</li> </ul>	3	Yes
	Mangrove degradation may increase risks from hurricanes and storms	Frequency of natural disasters linked to mangrove degradation	Mangrove Action Project / UNEP		3	Yes
	Forest fragmentation may increase likelihood of fires	Frequency of fires	Not available		3	Yes
Basic material for good life	Natural disasters impact livelihoods	Number of poor displaced by natural disasters	UNEP		3	Yes
		Change in household income following natural disasters	Not available		4	No
	Natural disasters can destroy access routes affecting availability of markets (livelihoods) and supply of food and other goods impacting health	None				No
Physical & mental health	Natural disasters such as landslides and floods can result in disease	Number of people ill from disaster-related illness	Not available		2	No

Aspect of health & well-being	Justification	Indicator	Applicable potential datasets	Notes	Highest category of dependence	Suitable for further investigation?
	outbreaks as well as injury and death	Number of people killed by natural disaster	Not available		2	No
Good social relations	Mental health impacts from stress of increased vulnerability	Number of post-traumatic stress disorder cases in countries affected by a natural disaster	WHO/MNH		5	Yes
<b>Climate regulation</b>						
Security	Climate change may increase the risk of natural disasters including heatwaves, floods, and landslides	Number of climate related natural disasters	UNEP-GRID Arendal / IPCC		3	Yes
	Climate change may increase stress leading to civil unrest	None				No
Basic material for good life	Climate change may affect crops, water availability, and food supply, which in turn impacts on livelihoods and basic materials available for good life	Change in variability of yields	UNEP		2	Yes
		Change in variability of water supply	UNEP		2	Yes
Physical & mental health	Climate change may impact availability of water, food, and energy which in turn impacts health	Change in variability of yields	UNEP		2	Yes
		Change in variability of water supply	UNEP		2	Yes
Good social relations	Climate change, ecosystem degradation, natural disasters displace populations and disrupt communities	Number of people displaced by natural disasters	ProAct Network / International Organisation for Migration / Internal Displacement Monitoring Centre / UNHCR		3	Yes

Aspect of health & well-being	Justification	Indicator	Applicable potential datasets	Notes	Highest category of dependence	Suitable for further investigation?
<b>Disease / pest regulation</b>						
Security						
Basic material for good life	Algae blooms affect livelihoods by adversely affecting fisheries.	Number of algae blooms affecting fisheries per year	Harmful Algal Events Database / HABSOS / GEOHAB / ProMED	Harmful Algal Events Database (HAE-DAT) is active and being refined, at present covering the Americas, Africa, Europe, and Pacific States. There are also good regional datasets, such as the Harmful Algal Blooms Observing System in the Americas (HABSOS), GEOHAB, etc.	2	Yes
	Invasive species can interfere with the availability of food	Measure of impacts of invasive species	Not available		2	No
Physical & mental health	Destruction and fragmentation of habitat may result in the introduction and re-emergence of disease	Outbreaks of new or re-emerging diseases	HealthMap		3	Yes
		Change in incidence of infectious disease cases	HealthMap		3	Yes
	Algae blooms may affect health	Cases of illness attributable to algae bloom	ProMED / HealthMap	The ProMED monitoring system and HealthMap also cover outbreaks of human and animal disease (including wildlife) associated with HABs.	3	Yes
		Use of locally available products for traditional/customary uses such pest/insect removal.	?		3	Yes
Good social relations						
<b>Pollination</b>						
Security						
Basic material for good life	Degraded or destroyed habitats may impair pollinator populations with resulting impact on yields and wild-	Pollinator populations	International Pollinator Initiative	Some good data exists in some regions (Europe, America, Australia, Far East). The	2	Yes

Aspect of health & well-being	Justification	Indicator	Applicable potential datasets	Notes	Highest category of dependence	Suitable for further investigation?
	food supply			development of regional and global datasets for pollinators is on the agenda for Global Pollinator Summit.		
		Status of and / or the yield from entomophilous crop species	FAO		2	Yes
Physical & mental health						
Good social relations						
<b>Cultural</b>						
<b>Identity</b>						
Security		Physical safety and security facet	WHOQOL, University of Bath	Several large international datasets available	3	Yes
Basic material for good life						
Physical & mental health	Spiritual, cultural, and recreational services contribute to mental well-being	Quality of life (QOL) facets on: <ul style="list-style-type: none"> <li>• Spirituality, religion &amp; personal beliefs opportunity for recreation &amp; leisure;</li> <li>• Positive feelings;</li> <li>• Negative feelings</li> </ul>	WHOQOL, University of Bath	The Psychological domain contains internationally agreed facets on: positive feelings, body image, self-esteem, thinking learning, negative feelings & spiritual QOL	3	Yes

Aspect of health & well-being	Justification	Indicator	Applicable potential datasets	Notes	Highest category of dependence	Suitable for further investigation?
Good social relations	Exposure to outside communities may result in a loss of cultural identity leading to mental health problems including alcoholism, depression, violence, stress, and even war	Health-related quality of life assessment	WHOQOL, University of Bath	<p>The WHOQOL measures six domains of QOL: physical, psychological, level of independence, social relations, environmental and spiritual QOL</p> <p>The Social relationships domain contains facets of: social support; personal relations and sex life</p>	3	Yes

## **Next steps**

### **Consultation and participation with data holders and other indicator initiatives**

One outcome of both the COHAB2008 side event and Geneva workshop was to highlight the breadth of agencies working on one or some aspects that could be incorporated into this indicator. It is therefore seen as essential that links be formed with the relevant agencies. The participants of the workshop (Annex II) offered a broad range of expertise and on-going collaboration with them is seen as essential. In addition, other agencies that were highlighted as data holders in the table above should also be involved, either directly or indirectly. Representatives of indigenous and other groups should also be included to ensure that the developed indicator adequately covers those already recognised as ‘absolutely dependent’, as well as to examine how best to reflect the differing situations between diverse communities at a sub-national level. Furthermore, the work of the Circumpolar Biodiversity Monitoring Programme and the International Indigenous Forum on Biodiversity (IIFB) Working Group on Indicators should be included where possible, thereby strengthening the message of all indicator initiatives. In a similar vein, consultation should involve both the Secretariat and other Indicator Partners of the 2010 BIP to examine the potential linkages suggested in above. Finally, SwedBio should be consulted given their long-running interest and support in this area.

### **Formation of working groups**

A key step in developing this indicator is to create a core working group, comprising representatives of the key data holders, experts on indicator development in the fields of health, well-being and/or ecosystem services and those with experience of working in the political realm. This group would need to meet periodically to practically review and discuss the development of this indicator, particularly given the short timeline as stated above. This group will comprise the participants at the workshop and others who were invited but unable to attend. In addition, any major data providers subsequently highlighted could be invited to join. For practical reasons, this group should remain small, with no more than twenty members.

A larger e-working group should be developed to ensure the widest possible opportunity for comment and potential input. This group would comprise representatives of other data holders, other indicator developers both in this and other less-related fields, and additional interested parties. This group need not have a size limit, and a larger the membership may have the extra benefit of wider buy-in from policy makers.

### **Systematic reviews & indicator development**

Initially, the next step would be a systematic review of the availability of other instruments (e.g., FAO Food Insecurity and Vulnerability Information and Mapping Systems, Children's Environmental Health Initiative) relevant to this indicator, followed by a second systematic review of the availability and suitability of proposed data. This would be best carried out by one agency (UNEP-WCMC). The e-working

group would have the opportunity to give input on these reviews, followed by a meeting of the core working group to look in detail at the next steps of development.

This should be carried out by September 2008 in order to allow for development in time for the EcoHealth Forum in December. The first round of refinement would follow in early 2009. In this way, the indicator may be suitably developed for inclusion in outputs from the 2010 BIP, if not in time for GBO-3, and put forward for consideration at the fourteenth meeting of the CBD Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA), and subsequently COP-10 in 2010.

### **Refinement for national use**

While the objective of developing an indicator for national and sub-national use will always be of particular importance, it must be seen as a global indicator first and foremost. With UNEP-WCMC already leading on the global-national linkages element of the 2010 BIP, work on this aspect will be on-going during the development phase. However, it is recognised that replicable and rigorous data may not be universally available for widespread national use.

Following adoption at COP-10, the indicator will then be further refined for use at a national level, with clear guidelines on the data necessary and case studies available. Further consultation with stakeholders will also occur to examine options for further development and strengthening of the global indicator, including the filling of data gaps and the inclusion or removal of variables, as necessary.

# Annex I: Agenda of Geneva Workshop

## I.1 Overall Goal

To develop, in line with the 2010 Biodiversity Indicators Partnership, a workplan for the development of an indicator on health and well-being of communities dependent on local ecosystem goods & services.

## I.2 Objectives

1. Discuss the potential form and scope of the indicator.
2. Review options for data sources.
3. Discuss potential outputs and their format.
4. Discuss potential sources of funding.
5. Develop a workplan for indicator development.

## I.3 Draft Agenda

<b>Day 1: Thursday, 12 June 2008</b>	
09.00	Welcome & Introductions Background Meeting objectives Finalization of meeting agenda
09.45	Progress to date <ul style="list-style-type: none"> <li>Review of indicator development using Millennium Ecosystem Assessment framework</li> <li>COHAB side event</li> </ul>
10.30	Coffee Break
11.00	Detailed discussion on form of indicator <ul style="list-style-type: none"> <li>Identity of measures / variables</li> <li>Number of measures</li> <li>Compilation as 'indicator'</li> </ul>
13.00	Lunch Break
14.00	Decisions on Range of Indicator <ul style="list-style-type: none"> <li>Scale of indicator</li> <li>Geographic coverage</li> <li>Taxonomic coverage</li> <li>Socio-economic context</li> </ul>
16.00	Coffee Break
16.15	Data needs and data provision <ul style="list-style-type: none"> <li>Data suitability – What types of data could be used?</li> </ul>
17.30	End of Day 1
<b>Day 2: Friday, 13 June 2008</b>	
09.00	Data needs and data provision (cont.) <ul style="list-style-type: none"> <li>Data accessibility – who has it and can we use it?</li> </ul>
11.00	Coffee Break
11.30	Format of product to be delivered <ul style="list-style-type: none"> <li>Report (background, description of indicator, results, interpretation, way forward)</li> </ul>
12.30	Workplan for indicator development
13.00	Lunch Break
13.30	Budget & potential funding sources
14.45	Closing remarks
15.00	End of Day 2

## **Annex II: Synopsis of the COHAB2008 Side Event**

### **GETTING TRENDY: MONITORING LINKAGES BETWEEN BIODIVERSITY AND HEALTH**

#### **Indicators of the Health and Well-being of Communities directly dependent on local ecosystems**

The side event was opened by Diarmid Campell-Lendrum (WHO). Tristan Tyrrell (UNEP-WCMC) followed with a brief introduction to the 2010 Biodiversity Indicators Partnership and the objectives of the side event. Monika MacDevette (UNEP-WCMC) and Diarmid Campell-Lendrum chaired the proceedings.

The objectives were listed as follows:

- I. Discuss the strategic importance of indicator monitoring to health and biodiversity
- II. Discuss options for indicators on the health and well-being of communities who depend directly on local ecosystem goods and services
- III. Propose a selection of these indicators for further development
- IV. Develop a set of proposals for these indicators as a basis for their development following the workshop

It was acknowledged that the list of objectives was highly ambitious given the available timeframe, and a suggestion that objectives II and III were prioritised was accepted. The discussion was then opened up to the floor to contribute suggestions and advice.

Contributions can be assigned to two groups: 'Options for indicators', namely areas of concern that should be addressed during indicator selection and development, and 'Selection of indicators for further development', thematic areas that could warrant further attention and potential full indicator development.

#### ***Options for indicators***

##### ***1. What datasets are available?***

- *Performance criteria*
- *Scale*
- *Availability of data*

It was commented that potential datasets need to be thoroughly checked for availability of relevant data, scale and using performance criteria.

##### ***2. Using current metrics on biodiversity and health and bringing them together***

Suggestions were voiced of the possibility of taking two, or more, unrelated sets of data and trying to examine or infer the relationships between them. Caution was encouraged over drawing overly tenuous linkages between them.

##### ***3. What groups in society?***

Concerns were raised of the disparity between data, separately concerning health and biodiversity, and the sectors of society to which they may be relevant.

*4. Differentiating between perceived and concrete measures*

Another concern was raised over the use of perceived and concrete measures in developing an indicator. The issue of performance criteria was relevant here.

*5. Global level indicators not necessary. Using available datasets, even at local level, to tell the story*

- *Problems, relating to performance, when scaling down to too great extent*

A suggestion of using national or sub-national data, where available, to develop the indicator(s) was made. Some responded to this that, as with point 3 above, it might not reflect the global (or even national) situation should the scale be too localised.

*6. Meta-analysis of local level examples to draw conclusions – indicative of wider scale*

Following on from points 1 & 5, using meta-analyses on well representative and scientifically rigorous local-level data may overcome the issue of excessive scaling down.

***Selection of indicators for further development***

*7. Child survival rates*

Examining the linkages of child mortality with ecosystem status and/or biodiversity.

*8. Malaria incidence*

- *Linking of mangrove loss to increase in malaria incidence*

Relating ecosystem status and extent to disease prevalence.

*9. Stunting of growth*

Using FAO data, the suggestion was put forward of looking at the linkages with nutrition and poor growth in indigenous populations. The difficulty in attributing stunting to nutritional intake was also acknowledged.

*10. Traditional food diversity*

- *Modifying FAO dietary assessment methodology to incorporate food biodiversity*

Examining the change in use of traditional foodstuffs by indigenous communities. The FAO methodology suggestion may be of more use in compilation of baseline data.

*11. Enhancement in cultural & recreational activities*

A review of trends in nature-based activities as an indicator of well-being was suggested.

*12. Consumption of resources*

- *Sustainable use/exploitation of foodstuffs*
- *Land conversion rates from natural to agricultural processes*

Looking at the sustainability in the use of species and habitats for nutritional and/or agricultural purposes. This may overlap too greatly with other 2010 BIP-related indicators and suggested linkages with health and well-being may be inconclusive.

### *13. Monetary values*

- *Cost of antimalarial measures*
- *Health cost relating to the loss of mangroves*

Relating financial values with biodiversity and ecosystem extent and status. Problems included the inconsistency in the use of currencies and fluctuating exchange rates over time.

### *14. Trends in flora biodiversity, particularly relating to health*

Examining the trends in species such as medicinal plants, for example using the IUCN Red List of Threatened Species or other datasets. Perhaps also linked to local disease outbreaks.

### *15. Use of fertilisers/pesticides in agriculture (per unit yield)*

This would give an indication of the level of agricultural development and dependence on yields. However, it may be difficult to decisively link this with health-related issues.

### *16. Quality of life indicators*

Based on work by WHO/University of Bath, the suggestion was put forward that quality of life data was available that would withstand performance criteria.

### *17. Infectious diseases & biodiversity*

- This relates to Jones, K.E., N. Patel, M.A. Levy, A. Storeygard, D. Balk, J.L. Gittleman, and P. Daszak. 2008. Global trends in human emerging infectious diseases. *Nature* **451**, 990-993.

A topical suggestion, as this paper was mentioned several times throughout the conference, examining the interconnectivity of zoonotic disease emergence with highly biodiverse areas was put forward.

Monika MacDevette closed the proceedings by thanking the participants for a fruitful discussion and said that these and other suggestions would be taken forward and examined to determine the best indicator development options. She ended by acknowledging the Swedish International Biodiversity Programme (SwedBio) for their generous support.

*Side Event Notice*

## **GETTING TRENDY: MONITORING LINKAGES BETWEEN BIODIVERSITY AND HEALTH**

**COHAB 2 Side event:**

***Tuesday, 26 February 2008 at 12:45 – 13:45  
Inis Mór 1, Radisson SAS, Galway, Ireland***

### **Indicators of the Health and Well-being of Communities directly dependent on local ecosystems**

Evidence is beginning to demonstrate that ecosystem integrity, including biodiversity, is gradually being eroded by human activity while at the same time, there is an emerging understanding that maintenance of biodiversity is essential to many of the ecosystem services that ultimately support human health and well-being.

However, to date, little work has been carried out to provide a solid and sustainable evidence base on how observed trends in biodiversity loss and ecosystem degradation affect human health, particularly in those, mainly indigenous communities who depend most directly on local ecosystem goods and services.

#### **This side event will:**

- Discuss the strategic importance of indicator monitoring to health and biodiversity
- Discuss options for indicators on the health and well-being of communities who depend directly on local ecosystem goods and services
- Propose a selection of these indicators for further development
- Develop a set of proposals for these indicators as a basis for their development following the workshop

The outputs of the workshop will be used to inform decision makers regarding indicators for further development, and inclusion in the suite of indicators measuring progress towards the 2010 Convention on Biological Diversity target.

For more information: <http://www.twentyten.net/>

## Annex III: Participants List

### III.1 Geneva Workshop

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### **III.2 COHAB2008 Side Event**

Please note this list is incomplete. The following were major contributors to the discussions:

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