Mapping Ecosystem Services to Human well-being (MESH): managing landscapes to achieve Sustainable Development Goals

Mapping Ecosystem Services to Human well-being – MESH – is an ecosystem service assessment and mapping toolkit developed by Bioversity International, CGIAR, and the Natural Capital Project in support of a Science for Nature and People (SNAP) project on ‘Making Ecosystems Count in the Sustainable Development Goals (SDG)’.

MESH is an integrative modelling framework that calculates ecosystem service production functions and maps ecosystem service provision under different landscape management scenarios. The base model of MESH integrates and extends ecosystem service models from the Natural Capital Project’s ‘InVEST’ toolkit into a graphical framework (Figure 1) and includes methods to automatically create input data, define scenarios and visualize outputs (without the need to use, e.g., ArcGIS). Development is underway to integrate models from King’s College London’s ‘WaterWorld’ policy support tool. Other models can easily be incorporated into MESH via a model plugin framework.

www.naturalcapitalproject.org/MESH.html
This link will be live starting from mid-November 2015

Figure 1: MESH interface

- Generate scenarios
- View result in various formats
- Select models of interest
- Prepare model inputs

Browse individual inputs and outputs in map format

Photo: Fishing on Rupa Lake, Nepal. Upstream and downstream communities work together to develop fishing regulations to ensure sustainable benefits for all. Credit: IWMI/N. Palmer
An extension to MESH that is under development, MESH-SDG, will generate outputs and indicators that are specific to the SDGs, based on findings from research and stakeholder consultation during the SNAP project. MESH-SDG will be designed to populate values for up to twelve SDG-relevant indicators (see Figure 2). These outputs will provide a basis for making comparisons of progress towards multiple national SDG targets across different scenarios of ecosystem change, for example, arising from land-use planning or investment decisions.

MESH can either run on global datasets where local data is not available or user-provided datasets for specific contexts and finer scale studies. Pilot studies in the Volta Basin will be used to test and validate the accuracy and utility of MESH in decision-making and feedback into model improvements.

Ecosystem changes can be linked to some SDGs more readily than others. We consider only those SDG targets where scientific evidence for linkages between ecosystem change and the target is convincing. MESH-SDG will link ecosystem change to six SDGs: food security (SDG2), health (SDG3), water (SDG6), sustainable cities (SDG11), climate (SDG 13), and conservation of terrestrial ecosystems (SDG15).

MESH-SDG outputs are designed to respond to the information needs of stakeholders seeking to achieve the SDGs, using the best available science (see Figure 3).

MESH contributors: Bioversity International, CGIAR (WLE, PIM), Columbia University, King’s College London, NCEAS, The Natural Capital Project, The Nature Conservancy

Figure 2: Current modelling capabilities of MESH and future modelling capabilities of MESH-SDG.

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<tr>
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<td>Identify infrastructure investment choice</td>
<td>Generate scenarios from mgmt. and other drivers</td>
<td>Model ecosystem dynamics</td>
<td>Map ecosystem supply/services</td>
<td>Assess effect on SDG targets</td>
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Management options
- Riparian Buffers
- Flow regime illustrated example
- Up-stream reforestation
- Green-economy plan
- Business as usual

Additional factors or drivers of change
- Population projections
- Climate change
- Price Changes

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<th>S1</th>
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<td>Natural flow</td>
<td>Hydropower max</td>
<td>Mixed strategy</td>
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Existing Models
- Water yield
- Hydropower
- Carbon storage
- Nutrient retention
- Sediment retention
- Habitat quality
- Pollination
- etc.

New Models
- Landscape nutritional potential
- Landscape degradation
- Malaria exposure
- Water availability to agriculture

Biophysical statements:
e.g.
The natural flow scenario reduced hydropower production by 10%
Reforestation increased nutrient retention 20%

Effect on indicators
Progress towards achievement of:
- SDG 2.2 malnutrition (indicator: landscape nutritional potential)
- SDG 2.4 sustainable food production (indicator: landscape degradation)
- SDG 3.3: reduce communicable diseases (indicator: malaria exposure)

Existing ecosystem service assessment approaches
Maps of priority conservation areas
Identifying winners and losers

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