Presentation overview

✓ A brief introduction into why we need tools

✓ An overview of some of the tools that are available – outlining **documented** pros and cons

✓ An open discussion on where you – *the audience* – feel there are strengths and weaknesses in the toolset from your experiences

Ecosystem assessment

"An ecosystem assessment provides **the connection between environmental issues and people**"

"An assessment of ecosystem services needs to consider both the **ecosystems from which the services are derived** and also the **people who depend on and are affected by changes in the supply of services**, thereby **connecting environmental and development sectors**"

Source: Ash *et al.*, 2010
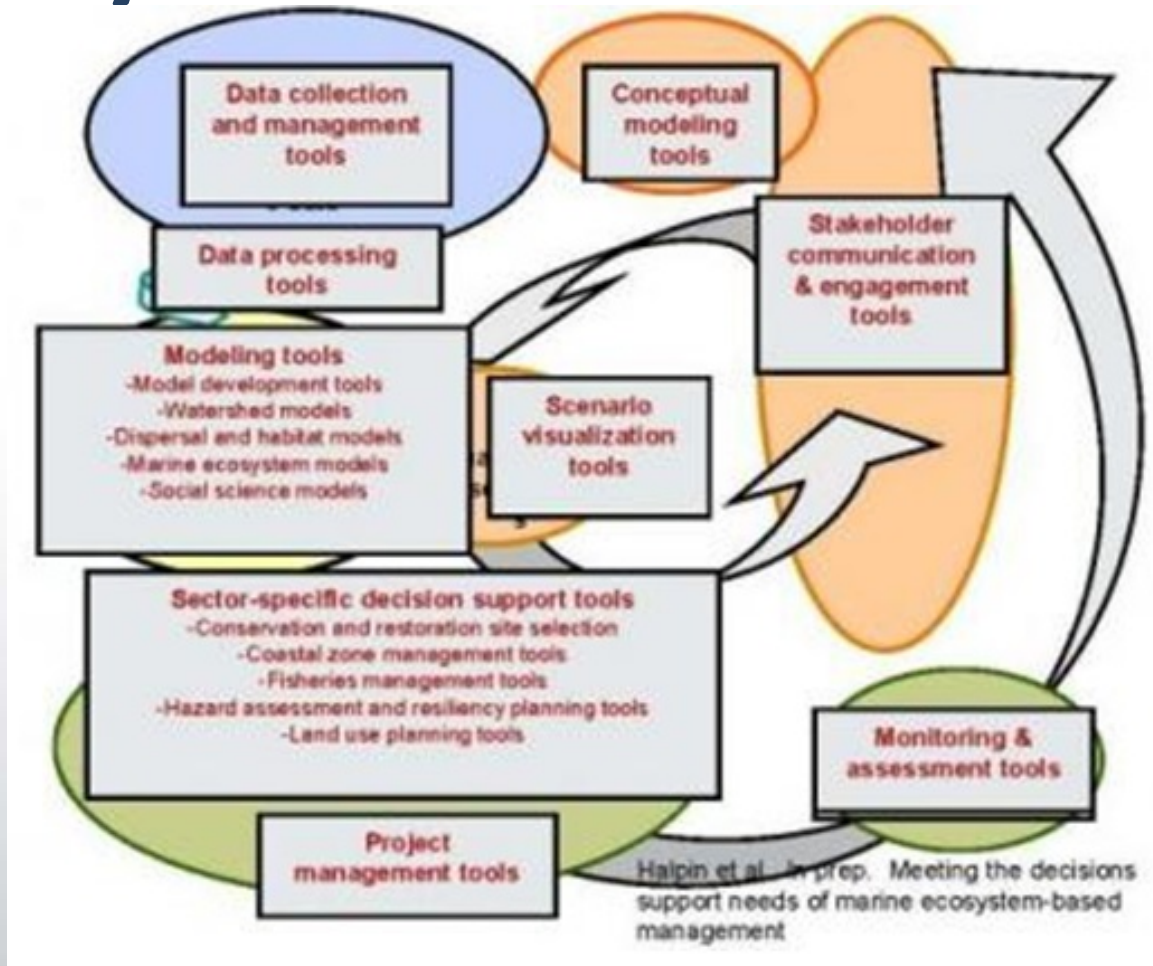
Ecosystem Assessment Tools

Ecosystem assessment tools are a suite of models, programmes, methods and concepts that **enable the understanding** of the contributions of ecosystem services **by measuring and quantifying** the effects of varying environmental conditions derived from land-use change.

Ecosystem Assessment Tools

www.ecosystemassessments.net

Ecosystem Assessment Tools
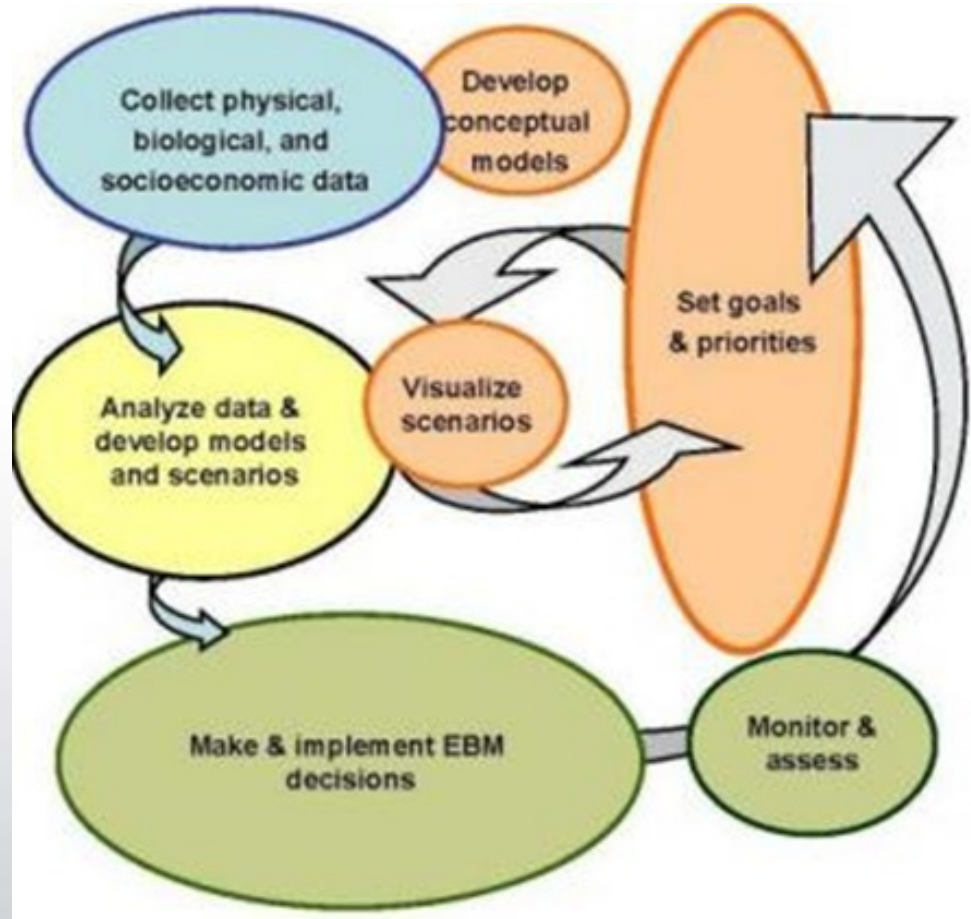
Source: http://www.ebmtools.org/about_ebm_tools.html

www.ecosystemassessments.net

Ecosystem Assessment Tools - Uses

Ecosystem assessment tools can be used to:

- ✓ Conduct assessments of ecosystem services
- ✓ Aid analysis within an assessment process
- ✓ Apply the findings of an assessment process
- ✓ Communicate the findings of ecosystem assessments

Ecosystem Services: A guide for decision makers
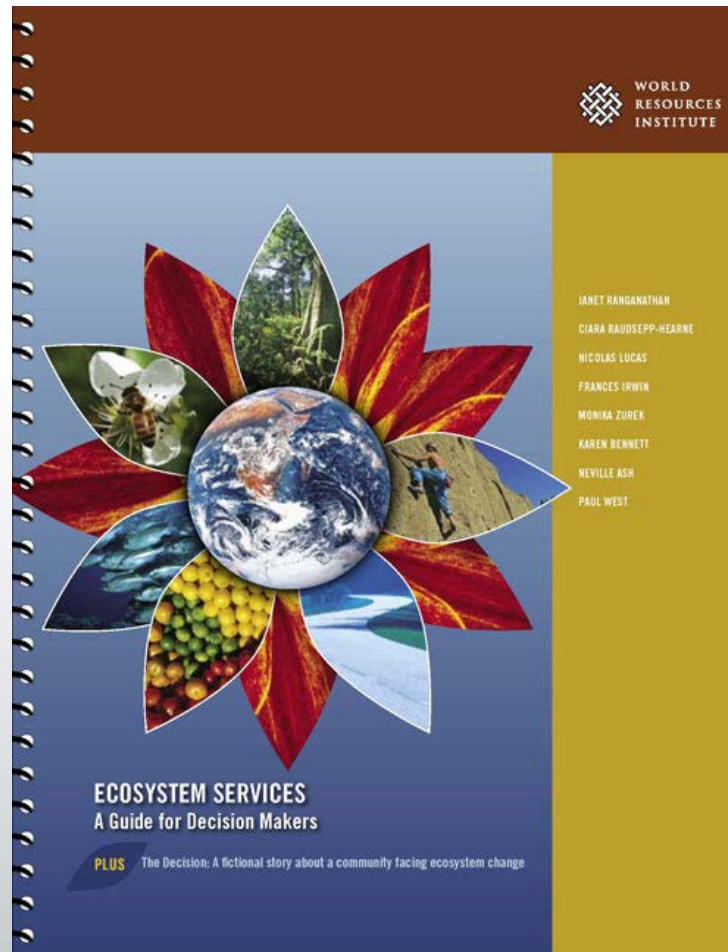
Ecosystems and Human Well-being: A Manual for Assessment Practitioners
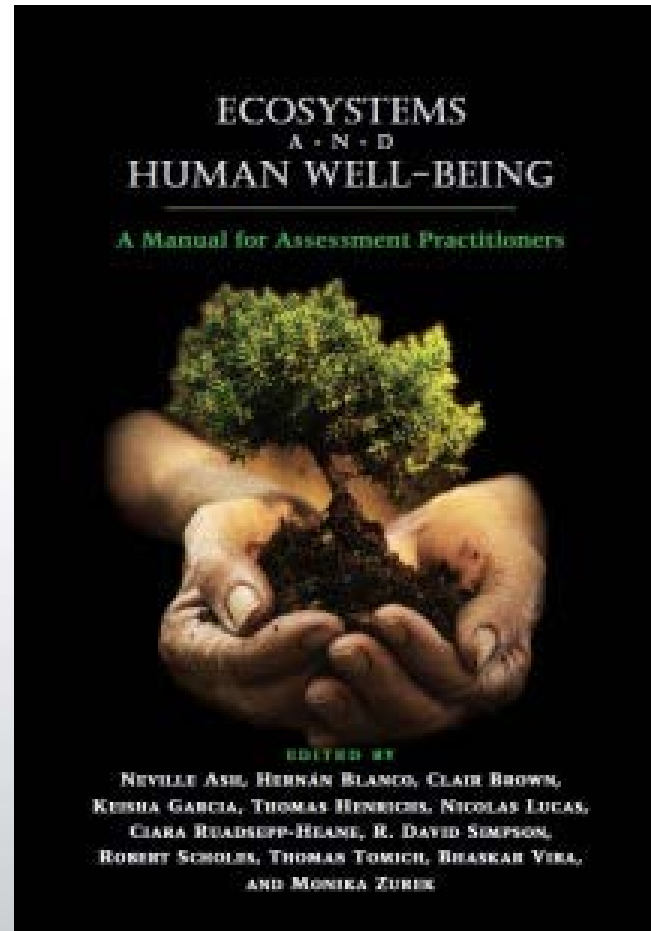
Mapping/spatial analysis tools

Various mapping tools available:

- ✓ ARIES
- ✓ CEV
- ✓ InVEST
- ✓ MIME
- ✓ PRESS-PEER

ARIES

ARIES
ARtificial Intelligence for Ecosystem Services

- ✓ A federally funded project aimed at **providing intelligent support to Ecosystem Service Assessment and Valuation** (ESAV)

- ✓ ARIES encodes relevant ecological and socioeconomic knowledge to **map ES provision, use, and benefit flows**

bc³
BASQUE CENTRE
FOR CLIMATE CHANGE
Klima Aldaketa Ikergai

INSTITUTO DE ECOLOGÍA, A.C.
INECOL

UNEP WCMC

The UNIVERSITY of VERMONT

CONSERVATION INTERNATIONAL

EARTH ECONOMICS

Source: http://www.ariesonline.org/

www.ecosystemassessments.net

ARIES – pros and cons

+ A powerful way to **visualise**, **value**, and **manage** ecosystems

+ Delivered to end users through the Web

+ **Accessible** through a standard web browser

+ Encompasses an ecosystem services explorer, valuation database, and biodiversity explorer in it's 'toolkit'

+ Allows **custom interfaces** to be built to simplify use by specific groups of end users

- Not yet complete (?)

Source: http://www.ariesonline.org/

Corporate Ecosystem Valuation (CEV)

wbcsd — business solutions for a sustainable world

- ✓ A framework for improving corporate decision-making through **valuing ecosystem services**

- ✓ A set of resources to navigate through related jargon and techniques

- ✓ The guide operationalises, at the company level, the framework proposed by The Economics of Ecosystems and Biodiversity (TEEB) initiative of the G8 Environment Ministers (2007/2010)

Source: http://www.wbcsd.org/work-program/ecosystems/cev.aspx

CEV – pros and cons

+ Is **complementary** to other business tools (e.g. ESIAs, LCAs)

+ A first-of-its-kind framework enabling companies to consider the actual **benefits and value of the ecosystem services** they depend upon and impact - catering directly for the needs of business

+ Developed through an 18-month process of close collaboration with businesses themselves

Source: http://www.wbcsd.org/work-program/ecosystems/cev.aspx

CEV – pros and cons

+ Fourteen members **road tested** the Guide, working with four partners: International Union for Conservation of Nature (IUCN), World Resources Institute (WRI), ERM and PwC

- It is not a stand-alone methodology

Source: http://www.wbcsd.org/work-program/ecosystems/cev.aspx

InVEST

natural capital PROJECT

ALIGNING ECONOMIC FORCES WITH CONSERVATION

✓ A joint venture among Stanford University's Woods Institute for the Environment, University of Minnesota's Institute on the Environment, The Nature Conservancy, and the World Wildlife Fund

✓ Developing tools for **quantifying the values of natural capital in clear, credible, and practical ways**

✓ InVEST models are based on production functions that define how an ecosystem's structure and function affect the flows and values of environmental services

Source: http://www.naturalcapitalproject.org/InVEST.html

www.ecosystemassessments.net

InVEST– pros and cons

+ Models are spatially-explicit, using maps as information sources and producing maps as outputs

+ InVEST returns **results in either biophysical terms** (e.g. tons of carbon sequestered) **or economic terms** (e.g. net present value of that sequestered carbon)

+ Spatial resolution of analyses is **flexible**, allowing users to address questions at the local, regional or global scales

+ Is **modular** in the sense that you do not have to model all the environmental services listed, but rather **can select only those of interest**

Source: http://www.naturalcapitalproject.org/InVEST.html

InVEST– pros and cons

+ User's Guide gives step-by-step guide to installing and running the tools, provides some of the theory behind each model and describes the input data requirements and how to interpret output results

+ Sample data is supplied so that you can get to know the models and how they work

+ Runs as script tools in the ArcGIS ArcToolBox

+ Does not require knowledge of Python programming

+/- Must have ESRI's ArcGIS software

+/- Need an ArcInfo level license

+/- Requires basic to intermediate skills in ArcGIS

Source: http://www.naturalcapitalproject.org/InVEST.html

MIMES

- ✓ Aims to illuminate the value of ecosystem services and to aid decision-makers in making more informed decisions about their management

- ✓ **Evaluates land-use changes** and subsequent effects on ecosystem services on global, regional and local levels

- ✓ A multi-scale, integrated suite of models that assess the true value of ecosystem services in a sophisticated and transferable system

Source: http://www.uvm.edu/giee/mimes/

www.ecosystemassessments.net

MIMES– pros and cons

+ MIMES models are organised into five different spheres: anthroposphere, atmosphere, biosphere, hydrosphere, and lithosphere

+ It will have the ability to **demonstrate trade-offs** among key services in dynamic ecosystems

+/- MIDAS is being developed as the visualisation decision support tool that will communicate the output of the MIMES model – *a tool to accompany a tool*

Source: http://www.uvm.edu/giee/mimes/

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glossary/ onsite documents

Ecosystem Services

canned scenarios

user survey

valuation

decision support tools

extend background

linked resources

professional resources

alexey's class

cgsee link

pro credentials

learning center

citizen awareness

encyclopedia of earth/ wikipedia

policy decisions

view screen shots with web browser

just curious?

use as tool

customize MIMES to your area **PC** *not Mac to date*

apply tools

modeling

apply MIMES to local decisions

get tools

dynamic modeling community

3 initial downloads links

get permission to be a developer

PRESS-PEER

✓ Designed to deliver innovative scientific research products with **immediate policy relevance**

✓ Designed to strengthen the scientific understanding of links between biodiversity and ecosystem services, improve impact assessment tools to link mapping exercises and policy evaluation approaches and illustrative case-studies

Source: http://www.peer.eu/projects/press/

www.ecosystemassessments.net

PRESS-PEER– pros and cons

+ Delivers tests of models

+ Provides evaluation of associated uncertainties

+ Provides a guideline for mapping of ecosystem services

- Funding of project not yet secured

- Product not yet completed nor delivered

www.ecosystemassessments.net

Economic valuation

Economic valuation: the attempt to assign quantitative economic values to ecosystem services

www.ecosystemassessments.net

Economic valuation

Techniques available:

Effect on productivity; cost of illness, human capital; replacement cost; travel cost; hedonic prices; avoided damages; contingent valuation; choice modelling; benefits transfer…

Direct use, Indirect use and Non-use values

www.ecosystemassessments.net

Economic valuation– pros and cons

+ Effective communication of ES values

+ Useful for decision and policy makers

+ Allows cost-effectiveness comparisons

+ Allows impact evaluation

+ Allows market development for ES

+ Can contribute to greater understanding of ES value

+ Leads towards more robust and sustainable development strategies

Source: http://pdf.wri.org/ecosystem_services_guide_for_decisionmakers.pdf

Economic valuation– pros and cons

- Results often highly subjective

- Method and assumption sensitive

- Services valued, assumptions for period of valuation and discount rate all effect the estimates produced

- Narrow focus

- Omission of important non-market and non-use values

- Inaccuracies due to incomplete understanding, complex processes and biological uncertainties

- Suspicion of valuation estimates

- Intrinsic values that cannot be quantified

Source: http://pdf.wri.org/ecosystem_services_guide_for_decisionmakers.pdf

Scenarios

The goal of scenario planning is to consider a variety of possible futures reflecting important uncertainties, rather than to focus on an accurate prediction of a single outcome.

www.ecosystemassessments.net

Scenarios– pros and cons

+ Responsive to stakeholder concerns

+ Can incorporate stakeholder knowledge

+ Can be specified to policy options for development goals

+ Can explore multiple consequences

+ Provide understanding of interactions, assumptions and trade-offs

+ Provides platform for discussion, cooperation, conflict resolution and empowerment

+ Flexible

Source: http://pdf.wri.org/ecosystem_services_guide_for_decisionmakers.pdf

Scenarios– pros and cons

- Time and resource consuming

- Requires skilled facilitation

- Can contribute to false sense of certainty

- Careful use and dissemination required

Source: http://pdf.wri.org/ecosystem_services_guide_for_decisionmakers.pdf

Measuring and monitoring ecosystem services at the site scale

✓ A new 'toolkit' for measuring ecosystem services at the site scale which is accessible to **non-experts** and delivers **scientifically robust** results

✓ Provides **practical guidance** for measuring ecosystem services

✓ Helps the user to identify **which** services to assess, **what** methods to use, and **how** to communicate the results for better biodiversity conservation
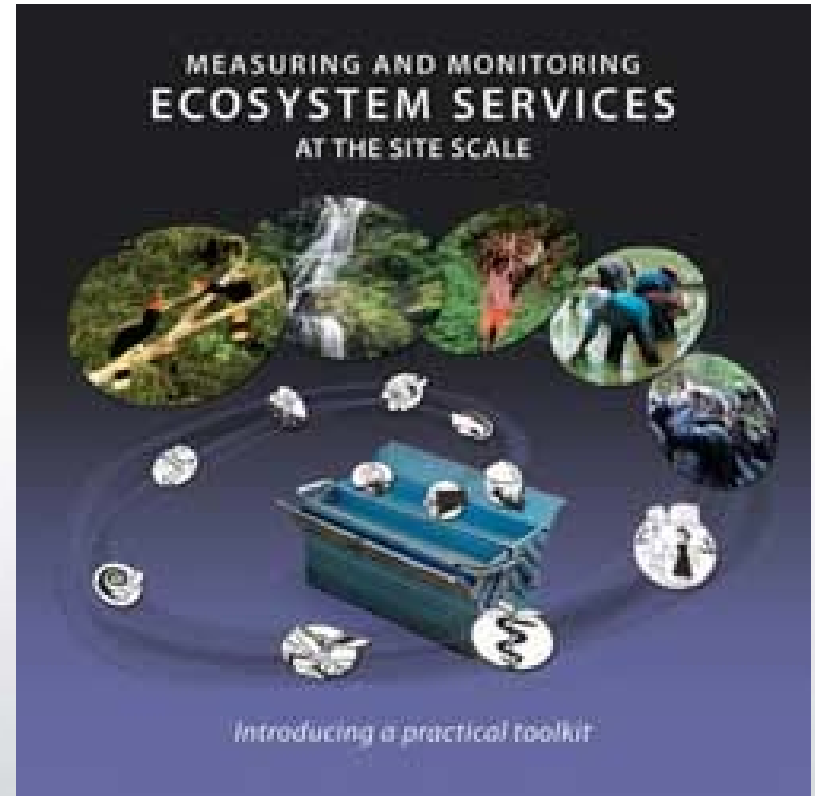
CCI and BirdLife International (2011)

Site scale toolkit – pros and cons

+ Good for users with limited capacity

+ Provides a **simple gross assessment** of ecosystem services at sites

+ Provides **scientifically robust** information on ecosystem services

+ Identifies the '**winners**' and '**losers**' in land-use change scenarios

+ Helps decision-makers appreciate the **true value of nature**, and the consequences of destruction and degradation of natural habitats

Source: CCI and BirdLife International (2011)

www.ecosystemassessments.net

Site scale toolkit – pros and cons

- Cannot assess *all* ecosystem services

- Cannot provide full economic valuations (although some monetary values can be calculated)

- Cannot provide ecosystem service assessments suitable for Payment for Ecosystem Service (PES) schemes and REDD projects

Source: CCI and BirdLife International (2011)

www.ecosystemassessments.net

Indicators and metrics

- A metric = quantitative measurement
- An indicator = anything that contains useful information (in the assessment context it is usually quantitative)
  - Single variables with some logical connection to the process or object of concern—they reflect in some unambiguous way its status, causes (drivers), or outcome

Source: Ash *et al.*, 2010

Indicators and metrics – pros and cons

- Attributes of "good" indicators:

    + Policy relevant

    + Scientifically sound

    + Simple to calculate and easy to understand

    + Practical and affordable

    + Sensitive to relevant changes

    + Suitable for aggregation and disaggregation

    + Usable for projections of future scenarios

- No single indicator can provide information on all policy relevant changes

Source: Ash *et al.*, 2010

Others…

- Ecosystem-based management tools network http://www.ebmtools.org/about_ebm_tools.html

- The Ecovalue Project – www.ecovalue.uvm.edu

- Casebase – www.eyes4earth.org/casebase

- Resource Investment Optimization System (RIOS)

- InSEAM - The InVEST ScEnArio Mapper - http://www.stanford.edu/~rpsharp/presentations/inseam_presentation/inseam_presentation.html

- Local Ecological Foot-printing Tool (LEFT)

- GIS

- EIA

- etc…….

http://www.ecosystemassessments.net/resources/tools-and-publications.html
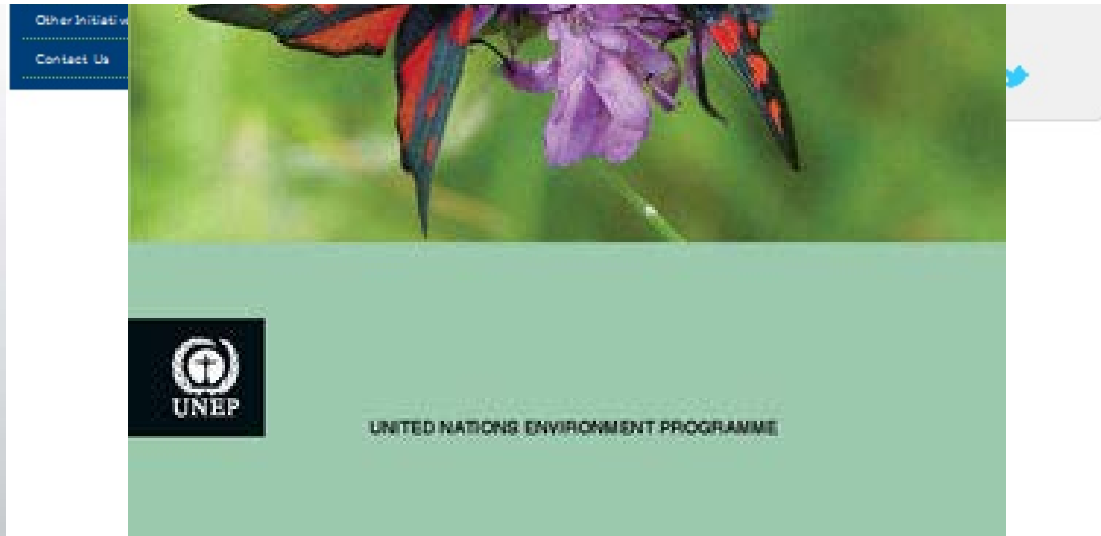
Thank you for your attention

The floor is now open for Q&A and feedback