The Economics of Ecosystems & Biodiversity

WELCOME
DAY 2

Mainstreaming the values of water and wetlands into decision-making

TEEB Professional training workshop
Kampala,, Uganda
24-27th November 2013

Organized by:
UNESCO-IHE, Netherlands and
UNEP TEEB Office, Geneva, Switzerland

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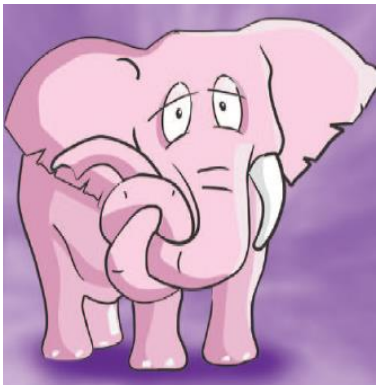
RECAP
Module 1



MODULE 2.

Improving measurement and assessment for better governance and wise use

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Objectives of Module 2

- To **explain why it is important to measure** the ES provided by wetlands
- To **present the main categories of indicators** that are available to measure and value wetlands' ES , in order to contribute to their wise management
- To explain the **uses, advantages and limitation of monetary valuation**
- To give **some examples** to illustrate these points
- To **practice** the choice of methodologies

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Training Programme (2)

MODULE 2. **Improving measurement and assessment for better governance and wise use**
Recap, knowledge check and objectives *Mathew Parr (IUCN NL)*
Valuation of wetlands: introduction to field techniques *Thierry De Oliveira (DEWA UNEP)*
Working with the data: examples of valuing water *Teddy Tindamanyire (Ministry of Water and Environment, Republic of Uganda)*
Lunch
Framing Economic Valuation for Ecosystem Services in Policy Context *Yong Jiang (UNESCO-IHE)*

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Valuation of wetlands: Introduction to field techniques

For more information: Chapter 3 of the TEEB W&W report

By Dr Thierry De Oliveira

The importance of ecosystem services and TEEB

- The major reason for overexploitation and degradation of ecosystems is the exclusion of the value of ecosystems' assets and the services they provide to humans from development policies (MEA 2005, MEA 2007, TEEB 2010, Waves Partnership 2013).

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Can we value the environment?

- We should attempt to estimate the value of the environment so that we may provide transparent decision-making information so that all relevant factors may be considered and including options for avoidance, minimisation and remedies.

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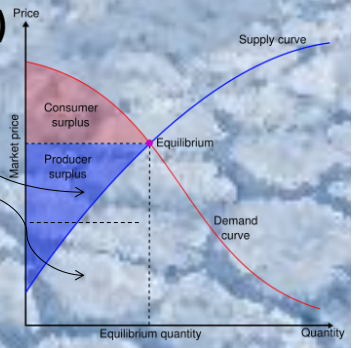
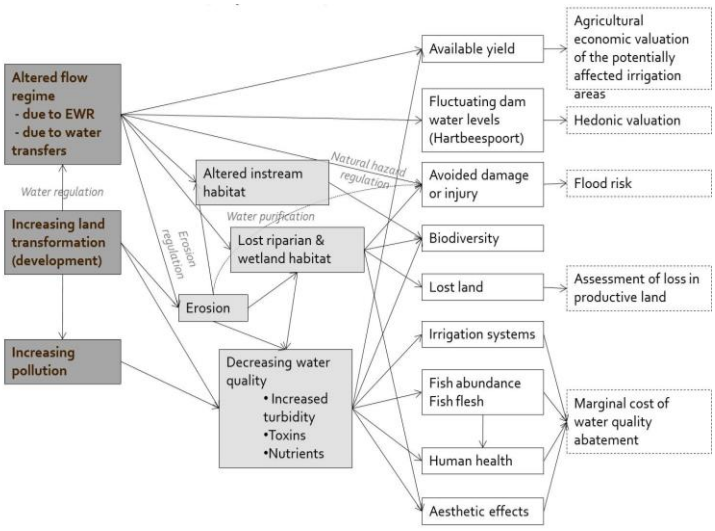
"Value of Wetlands"

- A market price is an indicator of the unit value of a traded good or service. But it is not the only indicator of the value of benefits produced. Other key indicators are:
  - Willingness-to-pay (WTP) (CS+PS)
  - Consumer surplus (CS)
  - Value added (VAD)
  - Intermediate consumption (IC)



WETLANDS ARE PART OF COMPLEX SYSTEMS



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TEEB: A FRAMEWORK FOR VALUING WETLAND ECOSYSTEM SERVICES

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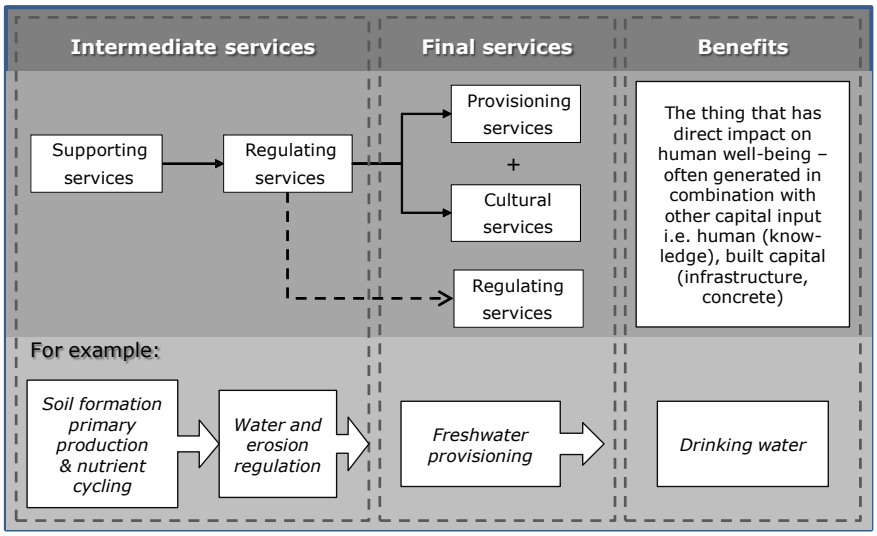

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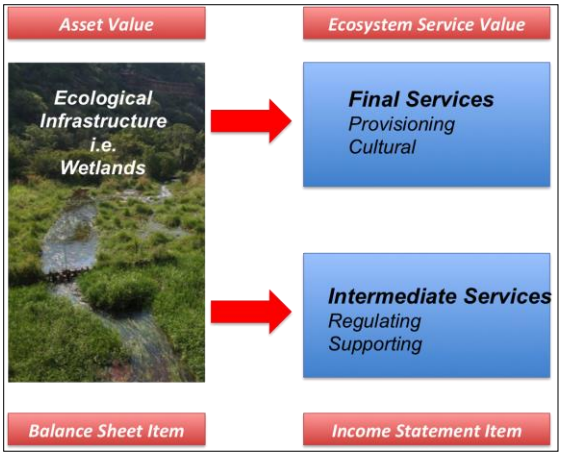
WETLAND ECOSYSTEM SERVICES

Flood attenuation
Streamflow regulation
Sediment trapping
Phosphate removal
Nitrate removal
Toxicant removal
Erosion control
Carbon storage
Maintenance of species biodiversity

Provision of water supply for direct human use
Provision of harvestable natural resources
Provision of cultivated foods.

Cultural significance
Tourism, recreation and scenic value
Education and research.



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POLICY CONSIDERATIONS

- An economic study is a means to an end, and the "ends" may be manifold.
- It must empower decision-makers

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Policy perspectives

- Improving policy-making
- Supporting the Green Economy
- Saving costs
- Optimising environmental taxes
- Assessing liability & compensation
- Measuring natural capital value
- Reporting performance

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How to measure the ES provided by wetlands?

1) **Qualitative, non-numerical indicators**, can be used to describe the ES that are not easily translated into quantitative information

This can help make them visible and promote their conservation

Examples:

- Changes in the beauty of a landscape
- Impacts on security and wellbeing
- Impacts on cultural and spiritual values

slide by Patrick ten Brink and Daniela Russi

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2) <u>Quantitative indicators</u> use physical/numerical units of measurement. Examples:

- <u>Provisioning ES</u>:
  - ***Freshwater abstraction*** *in a watershed (m^3/year)*
  - ***Crop production*** *(tonnes/year)*
- <u>Regulating ES</u>:
  - **Carbon sequestered** in peatlands (tonne/ha per year)
  - **Removal of nutrients** by wetlands (tonnes/year or %)
- <u>Cultural ES</u>:
  - Changes in the **number of residents** (n.)
  - **Number of visitors** to sites per year

slide by Patrick ten Brink and Daniela Russi

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<u>Geospatial mapping</u> allows the quantitative data to be linked with geographical information (e.g. which community benefits from clean water provision from a given wetland)

It can also be used to model the outcomes of alternative land and water management decisions on specific wetland sites

slide by Patrick ten Brink and Daniela Russi

3) **Monetary valuation**, which uses monetary unit of measurements:

- Methodologies based on **markets**
- Methodologies based on **revealed preferences**
- Methodologies based on **stated preferences**

slide by Patrick ten Brink and Daniela Russi

Contingent valuation

- Contingent valuation methods (CVM) are estimate economic values for based on surveyed interview data.
- Interviewees are presented with hypothetical scenarios and are asked how much they would be willing to pay (WTP) for a specific ecosystem service or their willingness to accept (WTA) as compensation for the loss of ecosystem services.

Hedonic pricing

- The hedonic pricing method estimates the proportion of property value attributable to the proximity of the property to an ecosystem.
- Uses statistical techniques to unpack property prices into the implicit prices for each of attributes, including ecosystem assets and services.
- Can be used for a variety of applications including proximity of properties to sources of traffic, proximity of environmental features and environmental hazards.

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Travel cost method (TCM)

- Travel cost uses the observed costs paid to travel to a destination or make use of an ecosystem service, to derive demand functions for that destination or service.

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Assumed preference valuation techniques

- **Market price**
  - estimates value of ecosystem services traded in commercial markets using standard economic techniques for measuring the economic benefits from marketed goods, based on the quantities purchased and supplied at different prices
- **Preventative expenditure**
  - This technique is also known as the averting behaviour technique. This technique values the environmental change through costs of preventing or mitigating a loss or a change in behaviour to achieve greater environmental quality
- **Replacement costs**
  - Replacement cost estimate value of ecosystem services based on the cost of replacing ecosystem services. This does not provide strict measures of economic values, which are generally based on consumer's willingness to pay for a service.

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Assumed preference valuation techniques

- **Damage costs**
  - Damage cost estimate value of ecosystem services based on the cost of damage associated with the loss of an ecosystem service. This does not provide strict measures of economic values, which are generally based on consumer's willingness to pay for a service. Instead these costs reflect, environmental damage, clean-up costs, criminal and civil convictions and other liabilities.
- **Human capital**
  - This approach measures the cost of poorhealth as a result of environmental change. More specifically, this cost measures the associated effects on the productivity of labour. This technique is closely linked with the cost of illness method (COI) which measures sickness related costs such as costs of medicines, doctor visits and hospitalisation.
- **Effect on production**
  - The objective of this valuation technique is to assess the physical change in production and to place an economic value with the prevailing market prices

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Total economic benefits: direct, indirect and induced economic effects

- The economic benefits generated within a single project or single economic sector generate secondary benefits for other economic sectors.
- Therefore: TEB = direct effect + indirect effect + induced effect.
- Whereas the direct effect of a project may be relatively easy to estimate, the indirect and induced effects are more difficult, and require economy-wide modelling.

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Ecosystem Services	Typical valuation techniques relevant
Provisioning services **Food** **Raw materials** **Fresh water** **Medicinal resources**	Market prices or direct proxies for market prices Replacement costs
Regulating services **Local climate and air quality** **Carbon sequestration and storage** **Moderation of extreme events** **Waste-water treatment** **Erosion prevention and maintenance of soil fertility** **Pollination** **Biological control**	Production function approach Damage cost Preventative expenditure Human capital / health costs Effect on production Replacement costs Preventative expenditure
Habitat or supporting services **Habitats for species** **Maintenance of genetic diversity**	The question of substitutability needs to be addressed here Conjoint analysis Contingent valuation
Cultural services **Recreation and mental and physical health** **Tourism** **Aesthetic appreciation and inspiration for culture, art and design** **Spiritual experience and sense of place**	Travel cost method Hedonic valuation Replacement costs Conjoint analysis Contingent valuation

BENEFICIARIES OF ECOSYSTEM SERVICES

	Local	Regional/ National	Global
Individuals / communities	Local users (e.g. hunter/gatherer, subsistence farmers and fishermen, recreation)	National and regional users (e.g. tourists, consumers, education)	Global users (e.g. tourists, consumers, education)
Commercial entities	Local industry (e.g. entrepreneurs, farmers, traders, artisans)	Economic sectors, national and regional GDP	International enterprise (e.g. fishery and forestry industry)
Public sector	Local Government (e.g. tax revenue)	National Government (e.g. tax revenue, foreign revenue from sale of concessions)	International Community

Practical Exercise Questions – Module 2

- Brainstorm the main beneficiaries of the ecosystem services provided by the wetland. Choose two beneficiaries - What ecosystem services they benefit from? How are they likely to suffer the impacts of (positive and negative) changes to the wetland ecosystems?
- How can the ecosystem services provided by the wetland be measured? Would you use qualitative, quantitative or monetary indicators?

Beneficiaries of the ES	ES they benefit from	Impacts suffered from a change in the ES provided by the wetland	How can ES be measured

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Coffee Break

WATER RESOURCE VALUATION IN TROPICAL SWAMPS:

THE HIDDEN COST OF EVERY DAY WATER ISSUE

TEDDY TINDAMANYIRE
TEEB PROFFESSIONAL TRAINING WORKSHOP
26th November 2013

Ministry of Water and Environment
BOX 9629 KAMPALA -UGANDA

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FRAMING THE VALUE OF WATER –AND WETLANDS GLOBALLY

The Rio+20 final declaration recognized water as a fundamental right and underlined its core role in sustainable development UNCSD (2012).

"The future we want" Valuing the water and biodiversity resources guides the realization of the future to come

(see Box 2.1) TEEB Book

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Why Water and Wetlands

Water itself has a value; this is most notable for drinking, irrigation, food production, sanitation, energy use, forestry, tourism, housing etc.

It is fundamental for society and for the economy and underpins most of our activities

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Why water

All sectors of the economy depend on water directly and/or indirectly. The agricultural sector depends on water for crop and livestock production; the energy sector for hydropower and for cooling at thermoelectric power

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What happens when there is no quality water

The lack of water can have significant effects on health, livelihoods, the economy, and on the operations and efficiency of industry across most sectors.

Hidden Costs we cannot obviously identify on first step

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Why value water

Where water is scarce, water security concerns can arise between users or between regions (e.g. in trans-boundary contexts). Water pollution can diminish the value of water in a similar way to scarcity by making the water unusable.

Over-abundance of water can be equally problematic; for example, the impacts of catastrophic flooding on lives, property and economy. For all these reasons, the wise use of water and management of the resource and its sources is of critical importance

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Wetland value – water interaction

Water purification & waste management:

- •decomposition/capture of nutrients and contaminants,
- •prevention of eutrophication of water bodies etc.
- •Removal of nutrients by wetlands (tonnes or percentage)
- •Water quality in aquatic ecosystems (sediment,
- •Turbidity (Case study of Nakivubo wetland

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Economic viability: two of the systems co-exist: acceptability and usability : Hidden costs

HIDDEN COSTS IN WATER VALUATION

- Time used to fill the Trough with Water
- Time lost in search for water for watering Animals if wetlands are removed
- Students not going to school in part of the year
- Cost of infrastructure
- Non Performance of boreholes
- Health costs due to sharing water facilities with

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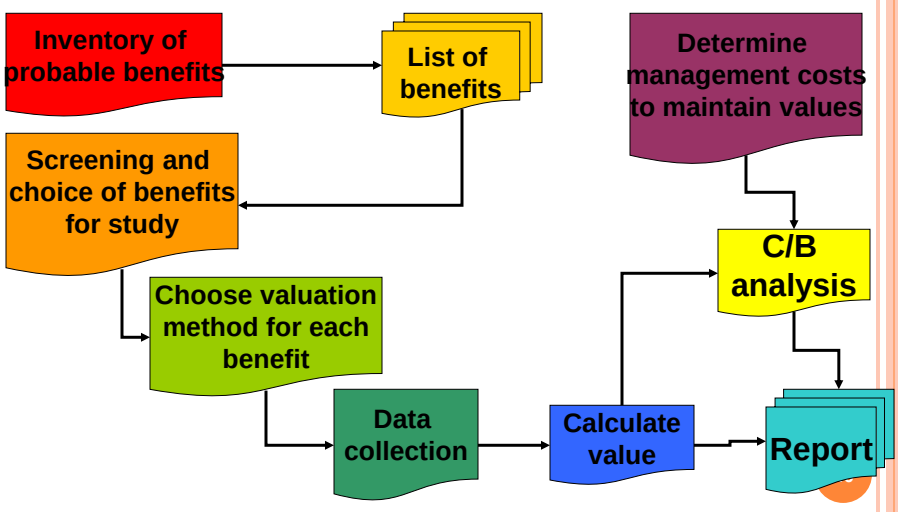
VALUATION STEPS

VALUATION STEPS



VALUNING ECOLOGICAL FUNCTIONS					
Wetland benefit	**Economic values**	**Valuation method**	**Information needed**	**Study area**	**Rank**
Water recharge and supply	**Shallow wells and surface water supplies**	**Replacement cost (e.g. purchase, boreholes)**	**Extent of water recharge with and without wetlands, population affected, costs of shallow wells, boreholes and purchased water per household or per capita.**		
Habitat and breeding	**Hunting, fishing**	**Reflected in direct uses**	**As above - direct values**		
Recreation and landscape	**Ecotourism**				

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VALUING ECOLOGICAL FUNCTIONS					
Wetland benefit	**Economic values**	**Valuation method**	**Information needed**	**Study area**	**Rank**
Water purification	***Clean water, better health***	***Replacement cost (treatment works)***	***Population getting clean water, costs of water/waste treatment***		
Sediment trapping	**Crop production and resource utilisation**	**Reflected in direct uses**	**As above - direct values**		
Flood attenuation	**Protection to houses, crops, infrastructure**	**Damage costs avoided**	**Extent, frequency and coverage of floods with and without wetlands, population affected, number and costs of houses, crops and infrastructure destroyed**		

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QUESTIONS TO ASK YOURSELF BEFORE CONDUCTING AN ECONOMIC VALUATION

1. What is the management or policy question?
2. Can economic valuation help answer the question?
3. Which type of analysis is appropriate?
4. Which ecosystem services are to be valued?
5. Which methodologies are available?
6. Which methodology is feasible in my context?
7. Which stakeholders involvement process will be used?

COMPUTATION GUIDE

MEASURE	TELLS US	METHOD OF CALCULATION	NOTES
1. Gross returns per resource user per year	Total value of resource	Quantity of resources per year X price	*Take into account seasonal variation*
2. Gross returns to labour per resource user per day	Total wage rate equivalent of resource use	Gross returns per year (1a) / no. days worked a year	*Take into account seasonal variation*
3. Net returns to labour per resource user per day	"Real" wage rate equivalent of resource use	(Gross returns per year (1a) - other costs per year) / no. days worked a year	*Costs expressed as USh per resource user per unit time, and lifespan is taken into account*
4. Net returns per resource user per year	"Real" value of resource	(Net returns to labour (3a) * no. days worked a year) - labour costs per year	*Include all time spent on activity, default labour costs USh 2,000/day (casual agricultural wage rate)*
5. Gross returns per unit land area per year	Total resource value per unit land	Gross returns (1a) / land area	*Not applicable to all resources*
6. Net returns per unit land area per year	"Real" value per unit land	Net returns (4a) / land area	*Not applicable to all resources*
7. Cash income per resource user	Cash value of resource		
a) Per year		Quantity of resources sold per year X price	*Take into account seasonal variation*
b) Per working day		Cash income per year (7a) / no. days worked a year	*Take into account seasonal variation*
8. Home consumption of resources per household per year	Subsistence value of resource	(Gross returns (1a) - cash income (7a)) * no. resource users in household	

COMPUTATION QUESTIONS

1. **Quantity of resources consumed/sold per user per year**
2. **Price of resources**
3. **Number of days worked a year**
4. **Other costs per year**
5. **Labor costs per year**
6. **Land area used by one user**
7. **Quantity of resources sold per year**
8. **Number of resource users in household**
9. **Number of resource users at study site**

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Lunch

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Training Programme (2)

MODULE 2. **Improving measurement and assessment for better governance and wise use**
Recap, knowledge check and objectives *Mathew Parr (IUCN NL)*
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Framing Economic Valuation for Ecosystem Services in Policy Context *Yong Jiang (UNESCO-IHE)*

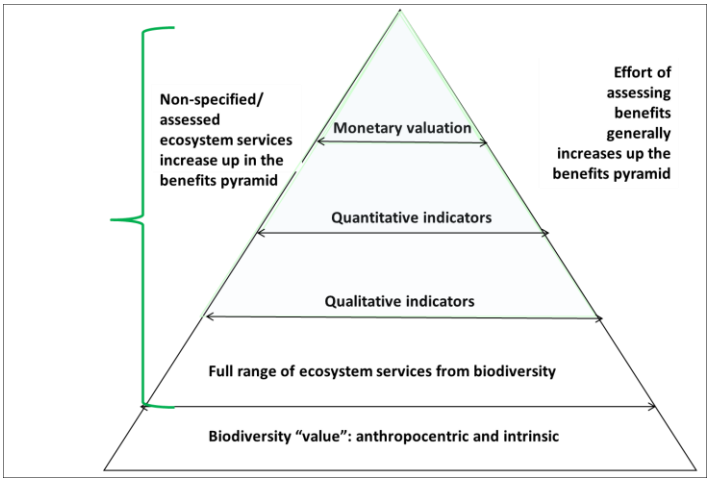
Framing Economic Valuation For Ecosystems in Policy Context

Attending the Workshop: Purpose?

. . .

How can you be sure that the economic valuation is done correctly, giving a valid, meaningful economic value?

The Top of Ecosystem Assessment: Economic Valuation



Source: Patrick ten Brink

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Overview

- The policy context: an overiew
- Relevant economic concepts:
  - Opportunity cost
  - Economic tradeoff
  - Economic value: definition & measurement
- Economic valuation: procedure
- What have we known about wetland value?

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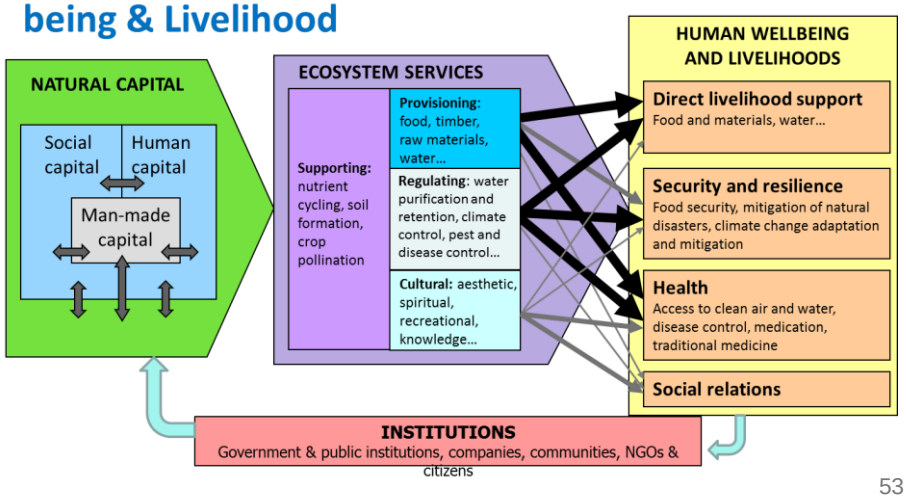
What is the Policy Context?

Contribution of Natural Capital to Human Well-being & Livelihood



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Pervasive Opportunity Cost

The Cost of Doing Something Includes Also What You Give Up for the Activity

- Making decisions requires comparing the costs and benefits of alternative choices.
- The **opportunity cost** of any item is whatever the maximum must be given up to obtain it.
- It is one important, relevant cost for decision making.

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Pervasive Opportunity Cost: Examples

- Coming to the workshop is not just the travel cost but also the foregone money you would otherwise make (of course, if you do not have the opportunity to make money or to generate economic value for yourself, your opportunity cost is zero).
- allocating water to irrigation agriculture is not just the financial cost of building infrastructure and pumping water, but also the forgone value of the water left in stream as environmental flow supporting ecosystem services.

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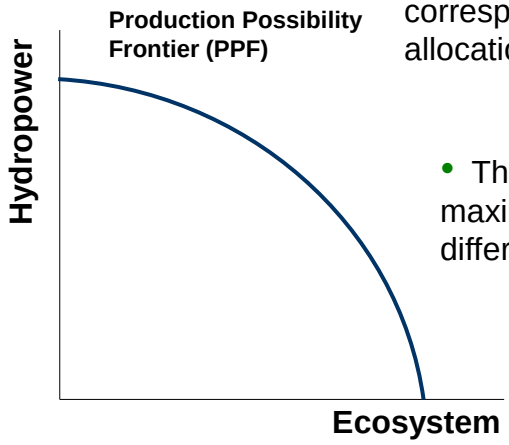
Economic Tradeoff



- Different points on the curve correspond to different resource allocations among users
- The curve represents the maximum physical outputs under different resource allocations

Economic Approach to Tradeoff

Efficiency: the total benefit of resource use is maximized

- Marginal analysis: to evaluate and compare the (addition/marginal) benefit and (additional/marginal) cost of action relative to the current situation

- Decision rule: if MB ≥ MC, do it; otherwise, don't do it

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ACTIVE LEARNING *1*

The Decision of Beach Development

A city is considering developing a mangrove ecosystem to a beach front resort for tourism.

A. How much development is economic efficient?

Development, %	Total Benefit, $	Total Cost, $
0	0	0
25	10k	5k
50	15k	11k
75	18k	18k
100	20k	50k

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Why Economic Valuation?

The need to recognize and incorporate the value or opportunity cost of ecosystems affected by development, policy, human activities at margin.

Otherwise:

- Resource use will not be efficient
- Development will not be sustainable

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Economic Value: What is it?

Economic value is anthropocentric, usually referring to the *full value of the contribution of a good/service/function to human welfare,* or the (total) utility to people in monetary term.

- Utility measures usefulness or desirability – reflecting individual's own assessment of well-being

- Economic value arises from the utility contribution of a good/service/function

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Economic Value: How to Measure?

- Economic value is usually measured by people's willingness to pay for goods/services (or willingness to accept for bads/dis-services)
- WTP = f (U), the higher the utility generated by a good/service, the higher an individual's WTP
- Welfare consequence: $\Delta U(WTP) = \Delta U(G/S)$
- Economic value represents the monetary tradeoff people are willing to make to obtain the good

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Economic Value

Marginal Value

- the value of the last unit of good/service, e.g., the value of the 1st (or 2nd, 3rd, 4th, …) apple

Total Value

- the sum of the marginal values of all units of good/service, e.g., total value of 5 apples

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ACTIVE LEARNING 2
The Economic Value of Drinking Water

Suppose you are thirsty right now.

A. How much are you willing to pay to have one **more** glass of drinking water in the following situation?

Water consumed, glass	WTP, $
0	
1	
2	
3	
4	

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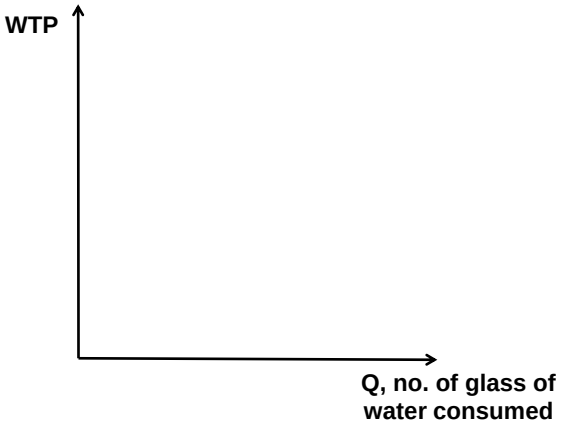
ACTIVE LEARNING 2
The Economic Value of Drinking Water

B. Present your answer to question A in the following graph



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ACTIVE LEARNING 3
The Economic Value of Mangroves

A city is considering developing a mangrove ecosystem to a beach front resort for tourism.

A. How much you are willing to pay to preserve an **additional** 1% of the mangrove ecosystem in the following situation?

Percentage preserved, %	WTP, $
0	
25	
50	
75	
100	

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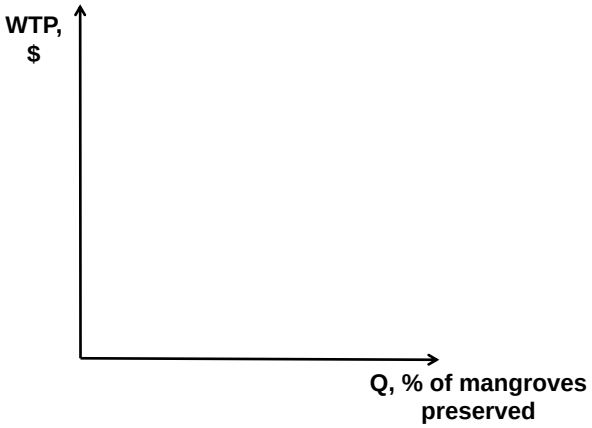
ACTIVE LEARNING 3
The Economic Value of Mangroves

B. Present your answer to question A in the following graph



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Utility & Economic Value: Estimate WTP

- Initial welfare with U
- After 1st glass of water:

  You welfare remains the constant
- Method: identify individual utility function for relevant changes (ecosystem, policy, etc)

Estimate WTP: U(-WTP,Q+1) = U(0,Q)

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Economic Valuation in Policy Context

Framing/Asking the "right" question?

Step 1: understand the policy/decision context/need for economic valuation

What is the driver for change (e.g., policy, human activities)?

Is economic valuation needed?

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Specific Contexts for Economic Valuation: Some Example

- Investment decision
  - How much investment should be made in a wetland conservation program?
  - How much wetland should be preserved?
- Benefit cost criteria for regulatory assessment
  - Does a regulation provide more benefits than its costs?
- Natural resource damage assessment
  - How much damage has BP oil spill in the Gulf of Mexico caused to ecosystems?
  - How much compensation should BP make for its oil spill damage?

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Economic Valuation in Policy Context

Framing/Asking the "right" question?

Step 2: Identify/define changes/impacts to ecosystems and human welfare

How will the ecosystem be affected? Relevant to who (stakeholders)? Which services and values? To what extent?

A key step: identifying the linkage between drivers and ecosystem consequences relevant to welfare

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Stakeholders of Wetlands

Direct users	Directly harvest wetland goods
Direct exploiters	Dredge sediments in wetlands, exploit mineral resources, clay, ..
Agricultural producers	Drain and convert wetlands to agricultural land
Water abstractors	Use wetlands as sources of drinking water, agricultural irrigation
Human settlements	Wetlands as sites for human settlement expansions
Indirect users	Benefit from indirect wetland services, such as storm abatement and flood mitigation
Nature conservation and amenity groups	Groups with objective to conserve nature and groups who enjoy the presence of plant and animal species

Source: Turner et al. 2000

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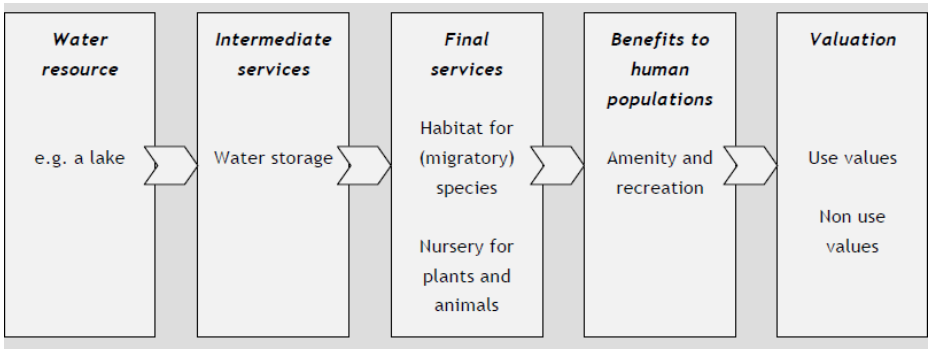
Ecosystems to Stakeholder Value



Source: Luisetti, T., Turner, R. K. and Bateman, I.J. (2008) 'An ecosystem services approach to assess managed realignment coastal policy in England', CSERGE Working Paper, ECM-2008-04.

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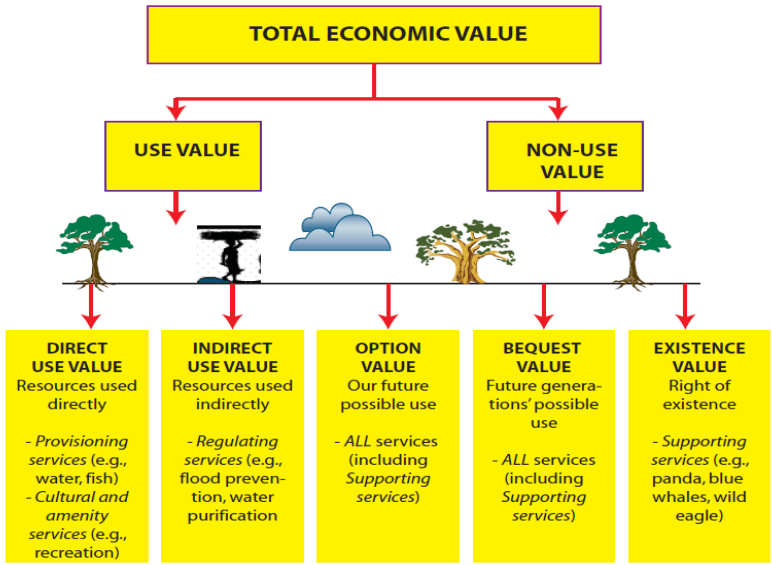
Economic Value of Ecosystem Services



Source: De Groot et al. 2003

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Wetland Functions, Ecosystem Goods & Services, Value Types

Function	Goods & Services	Value Type
Flood and flow control	Flood protection	Indirect use
Storm buffering	Storm protection	Indirect use
Groundwater recharge/discharge	Water supply	Indirect use
Water quality maintenance and nutrient retention	Improved water quality	Indirect use
	Wastewater treatment	Direct use
Habitat and nursery for plant and animal species	Commercial, recreational fishing and hunting	Direct use
	Harvesting of natural materials	Direct use
	Energy resources	Direct use
Biodiversity	Human welfare	Indirect use/non use
Micro-climate stabilization	Climate stabilization	Indirect use
Carbon sequestration	Reduced global warming	Indirect use
Natural environment	Amenity, recreational activities	Direct use
	Culture, heritage	Non-use

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Estimating Economic Value in Policy Context

Asking the "right" question?

Step 3: Choose the appropriate valuation technique to estimate the economic value of involved ecosystem services

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Types of Economic Valuation Methods

Primary methods: approaches specially designed to generate original valuation evidence

- Market price methods (cost-based, production input)
- Revealed preference methods: hedonic pricing, travel cost, recreational demand,
- Stated preference methods: contingent valuation, choice modeling

Secondary method: approach to generating secondary value estimates from previous studies

- Benefit transfer

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Economic Valuation: Summary

Three important questions

- How are wetlands relevant to decisions?
  How would the policy/decision affect wetlands? Fully wiped out or a small change?
- To whom are wetlands valuable?
  Human beings in general, stakeholders in specific, as economic value is utilitarian and anthropocentric
- What values are generated from wetlands?
  What goods/services benefit or meet human needs?

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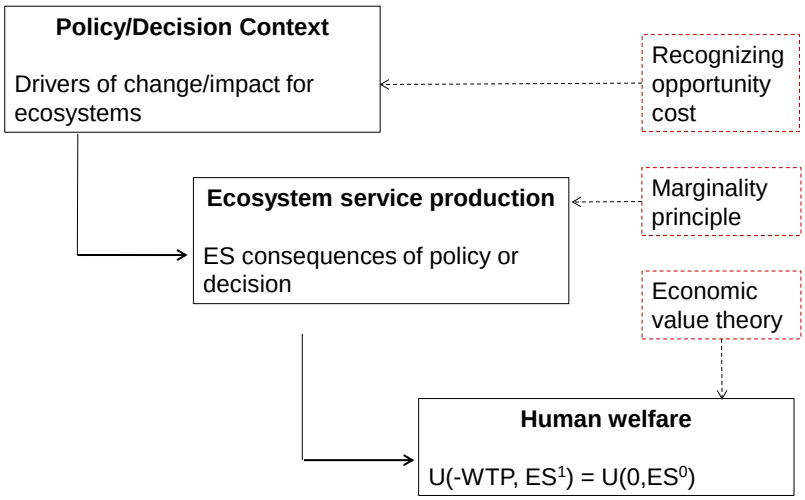
Economic Valuation: Summary

Three steps



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Wetland Values: What We Know?

- One of the most studied non-market "goods" worldwide
- Several meta-analysis of wetland values
- Values are highly variable, depending on location, value type, method, scale, and substitute

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Wetland Values: What We Know?

Distribution of Studied Wetlands

Source: Brander et al. (2006)

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Economic Value of Global Wetlands

Total Economic Value of Global Wetlands by Continent and Wetland Type (thousands of US$ per year, 2000)

	Mangrove	Unvegetated. Sediment	Salt/Brackish Marsh	Freshwater Marsh	Freshwater Woodland	TOTAL
N America	30,014	550,980	29,810	1,728	64,315	**676,846**
Latin America	8,445	104,782	3,129	531	6,125	**123,012**
Europe	0	268,333	12,051	253	19,503	**300,141**
Asia	27,519	1,617,518	23,806	29	149,597	**1,818,534**
Africa	84,994	159,118	2,466	334	9,775	**256,687**
Australasia	34,696	147,779	2,120	960	83,907	**269,462**
TOTAL	185,667	2,848,575	73,382	3,836	333,223	3,444,682

Source: WWF (2004)

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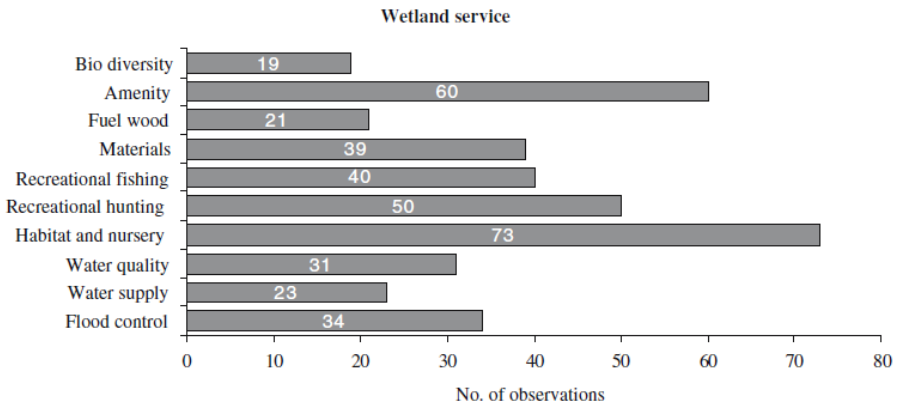
Wetland Services Valued



Source: Brander et al. (2006)

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Some Economic Valuation Databases

Name of database	Web host	Purpose of the database	Number of studies	Regions covered	Available languages
Environmental Valuation Reference Inventory	Environment Canada on behalf of the EVRI Club[1] http://www.evri.ca	To help policy analysts using the benefits transfer approach to estimate economic values for changes in environmental goods and services or human health.	1500	International	English, French
Envalue	New South Wales Environment Protection Authority http://www.epa.nsw.gov.au/envalue	To help stakeholders value changes in environmental quality.	400	International	English
Ecosystem Services Database	Gund Institute for Ecological Economics, University of Vermont http://esd.uvm.edu	To provide a data and analysis portal to assist in the informed estimation of the economic values of ecosystem services.	300	International	English
Review of Externality Data	European Commission http://www.red-externalities.net	To assist policy makers in capturing the effects of externalities from new policies that have sustainable development as their core concern.	200	International	English

Source: McComb et al. (2006)

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Valuation Exercise – Mangroves and tourism

- 10% of a mangrove ecosystem to a beach front resort for tourism.
- The mangrove ecosystem is central to the livelihood of local communities:
  - capture fishery supported by the system.
  - unique spiritual, cultural value.
- An agreement with the government, allowing the development conditional on a fair compensation for the welfare loss of local people.

The question is how much the city should pay to local people to make them at least no worse off as compared to before development. Suppose you are hired as a consultant to estimate the compensation the government should be made to local households.

Exercise

- What is the issue?
- How will the mangrove ecosystem be affected?
- Who are the stakeholders?
- What ecosystem services are involved and will be affected?
- What values/benefits are derived by stakeholders?
- Describe the steps for implementing this consulting project?
- What information do you need in order to carry out economic valuation?
- Which economic valuation approach(s) do you consider to use?

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Coffee Break

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DAY 2 – final session

Recap Day 2
Gaps to be filled
Closing discussion on application

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Objectives of Module 2

- To **explain why it is important to measure** the ES provided by wetlands
- To **present the main categories of indicators** that are available to measure and value wetlands' ES , in order to contribute to their wise management
- To explain the **uses, advantages and limitation of monetary valuation**
- To give **some examples** to illustrate these points
- To **practice** the choice of methodologies

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Training Programme (2)

MODULE 2. **Improving measurement and assessment for better governance and wise use**
Recap, knowledge check and objectives *Mathew Parr (IUCN NL)*
Valuation of wetlands: introduction to field techniques *Thierry De Oliveira (DEWA UNEP)*
Working with the data: examples of valuing water *Teddy Tindamanyire (Ministry of Water and Environment, Republic of Uganda)*
Lunch
Framing Economic Valuation for Ecosystem Services in Policy Context *Yong Jiang (UNESCO-IHE)*

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Training Programme (3)

MODULE 3. **Integrating the value of water and wetlands into decision-making**
Recap, knowledge check and objectives *Mathew Parr (IUCN NL)*
Policy Design and Instruments for specific Policy Decisions *Andrew Farmer and Thierry De Oliveira*
Exercise and Work groups
Lunch
Closing Discussion, dissemination strategies and Outreach *Ken Irvine and Mathew Parr*

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END DAY 2

Mainstreaming the values of water and wetlands into decision-making

TEEB Professional training workshop
Kampala,, Uganda
24-27th November 2013

Organized by:
UNESCO-IHE, Netherlands and
UNEP TEEB Office, Geneva, Switzerland