Water Valuation

By
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Outline of Talk

- Introduction - How much is Water Worth/What is the True Value of Water?
- Valuing Water as an Economic Good
- Valuing Water as a Social Good
- Valuing Water as an Ecosystem Good
- Finding a Balance to Give Water Its Due Value
- Conclusion

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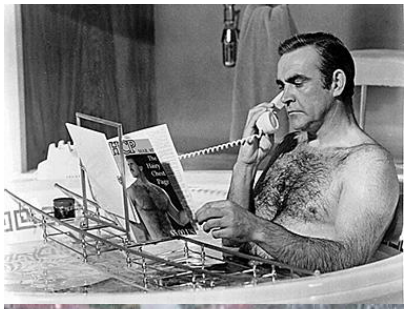
WATER IS LIFE, WITHOUT WHICH THERE IS NO LIFE!

(31) Without water, how long can a person lasts before dying?
Tanpa air, berapa lama seorang manusia dapat bertahan hidup sebelum mati?

a) 8 -14 DAYS
b) 15-21 DAYS
c) 3 -7 DAYS



YET IT IS THE MOST UNDERVALUED, ABUSED, WASTED AND "TAKEN FOR GRANTED" RESOURCE!

The Paradox of Value

- The **paradox of value** (also known as the **diamond–water paradox**) is the apparent contradiction that, although WATER is on the whole more useful, in terms of survival, than diamonds, DIAMONDS command a higher price in the MARKET.

- According to the philosopher ADAM SMITH,

"The word VALUE, has two different meanings, it sometimes expresses the utility of some particular object, and sometimes the power of purchasing other goods. The one may be called "VALUE IN USE" the other, "VALUE IN EXCHANGE." The things which have the greatest value in use have frequently little or no value in exchange; on the contrary, those which have the greatest value in exchange have frequently little or no value in use. Nothing is more useful than water: but it will purchase scarcely anything; scarcely anything can be had in exchange for it. A diamond, on the contrary, has scarcely any use-value; but a very great quantity of other goods may frequently be had in exchange for it"

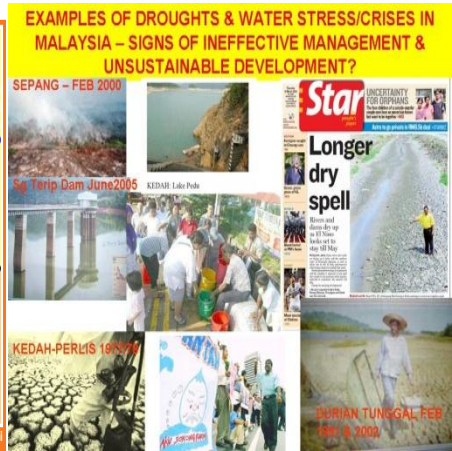
(Source: Smith, Adam (1776) "Of the Origin and Use of Money". *An Inquiry into the Nature and Causes of the Wealth of Nations*. Retrieved April 2006.)

THE VALUE OF WATER IN MALAYSIA

- **Malaysia's NEW ECONOMIC MODEL (NEM), launched in March 2010, aims to transform the Malaysian economy from a mid-income to high income economy with quality growth by 2020.**

- **WATER is a key ingredient to sustain the NEM. Without adequate water resources, the NEM would collapse.**

- **"POLITIZATION OF WATER" – Politics have "Devalued" the value of water in the country!**



THE VALUE OF WATER IN MALAYSIA

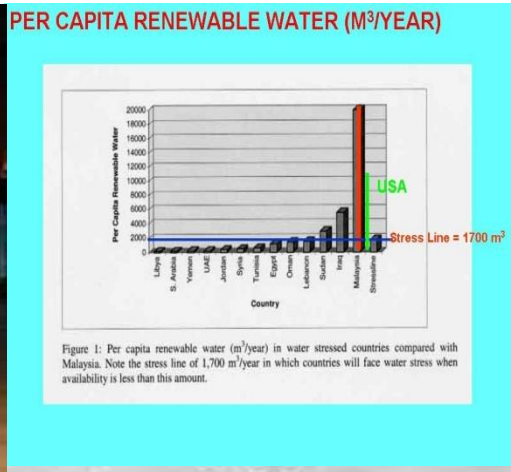


Figure 1: Per capita renewable water (m^3/year) in water stressed countries compared with Malaysia. Note the stress line of 1,700 m^3/year in which countries will face water stress when availability is less than this amount.

- **"WATER-RICH" MALAYSIA? – Annual Rainfall 973Bm³, Surface Runoff 496Bm³ & Groundwater Storage 5000Bm³ = Per capita renewable water > 10 times the international water stress line of 1,700 m³, BUT we are far from achieving water security.**


Don't politicise water issue, state govt told

- **"HUMAN-CAUSE WATER PROBLEMS" - Destruction of water catchments, water pollution, water wastage, high non-revenue water, low tariffs, lack of incentives for conservation and ineffective governance.**

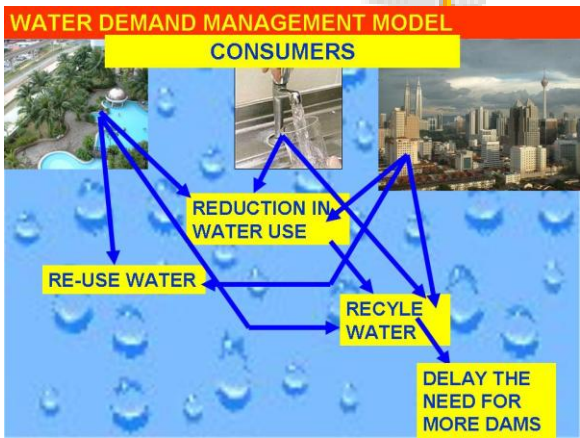
- **"PUBLIC APATHY DEVALUE WATER" - Low awareness, poor ethics, general apathy & "Disinterest" result in lack of appreciation & respect for water leading to lack of concern/commitment for water saving.**

THE VALUE OF WATER IN MALAYSIA

•**OVER-RELIANCE ON STRUCTURAL PARADIGM (GOVERNMENT-CENTRIC APPROACH)– addresses only the supply side of water & reinforce the belief that Government is Solely Responsible for water supply.**

•**WATER DEMANDS EXPLODES DUE TO THE LOW VALUE (TARIFF) OF WATER - When water consumers are not sensitised, their water demands will quickly out-pace water supply.**

•**GOVERNMENT SUBSIDIES COMPLETELY "KILLS" THE VALUE OF WATER – "Cost Recover is but a DREAM", let alone make Profits!**

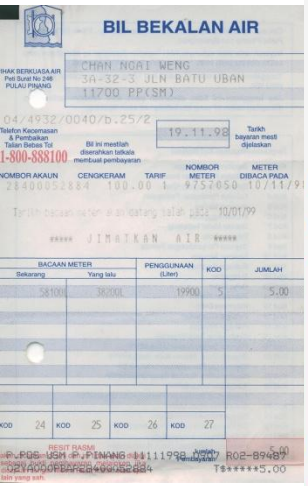


The Biggest Problem with Water in Malaysia

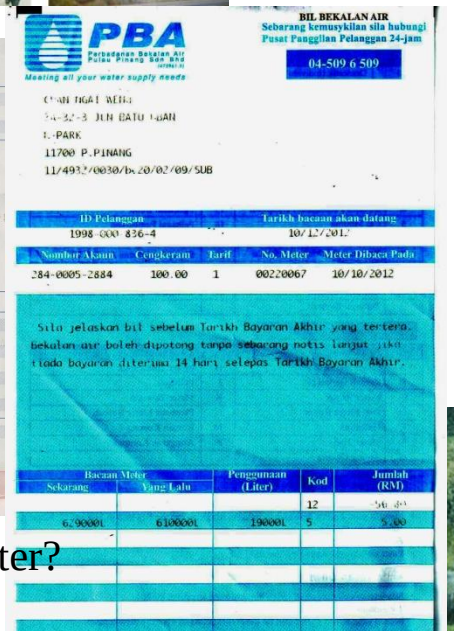
WATER HAS NO VALUE IN THE EYES OF THE PUBLIC!

"Water has no value" UTM – MWA Industry Roundtable/Forum, Dewan Jumaah, International Campus, UTM Kuala Lumpur, October 28, 2011

HOW CAN ANY VALUE BE PUT TO WATER WHEN WATER IS TREATED IN THESE APPALLING WAYS?



Almost Free Water?

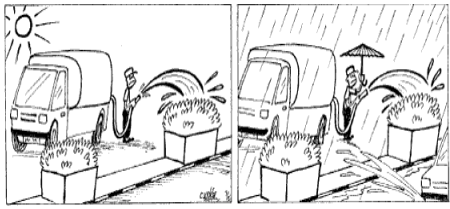


- (21) How many cubic metres of water are given free in Selangor?
- Berapa kubik meter air yang pertama yang diberikan secara percuma di Selangor?

Free Water?

A) 10 CUBIC METER
B) 20 CUBIC METER
C) 25 CUBIC METER

Public Apathy



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Valuing Water as an Economic Good

- **Started with the "Dublin Principles" (1992) and IWRM—approach recommended for MDGs**
- **2002 World Summit on Sustainable Development in Johannesburg**
- **2003 Third World Water Forum**
- **2006 World Water Development Report**
- **Human Development Report 2006**
  Beyond scarcity: power, poverty and the global water crisis

What is meant by 'Economic Value' of Water?

A commodity has an economic value when people are *willing to pay* for it, rather than go without it

Water is an essential commodity, so the value of a small/basic amount for survival is *infinite* — people would pay *any price*.

But *after basic needs are met*, people buy water based on its price compared to other goods they might buy.

Water's value is the willingness to pay for water

It is observed when people make a choice between different products

- **How much will a household pay for drinking water?**
- **How much will a farmer pay for irrigation water?**
- **How much will a factory pay for clean water?**

Why is there a Need to Value Water?

Water as an Economic Good: **After basic needs are met, water should be allocated to the highest value uses.**

Water value provides critical information for decisions about the following:

- Efficient and equitable allocation of water among competing users, both
  - within the present generation
  - between present and future generation
- Efficient and equitable infrastructure investment in the water sector (how much, where, when)
- Efficient degree of treatment of wastewater
- Design of economic instruments: water pricing, property rights, tradable water rights' markets, catchment protection, taxes on water depletion and pollution, etc.

Water Tariffs and Water Value in Malaysia

Why can't we value water like any other natural resource?

- Because the price is determined by Politics, not Markets
- Because Water is a very Sensitive Social Issue
- Because Water is Heavily Subsidised & Tariffs charged are more often unrelated to value of water, i.e. too low
- Because Water Privatisation is Viewed Negatively
- Because Water Price often does not even reflect full costs of water supply! (Even Full Cost Recovery is "Fiercely" Contested)
- Because Water is not supplied by competitive markets due to natural characteristics & Government Intervention (Subsidies)
  - Water is Necessary for human survival, hence profits are frowned upon
  - Water Sector in Malaysia is a Monopoly, not a free market
  - Water is characteristic of Public Good & considered by Masses as a Government Responsibility

Water Tariffs and Water Value Elsewhere

Some markets for trading water rights are developing in Australia, California (USA) &Chile - but it is still uncommon & very local

Price of tradable water rights does not yet provide a reliable indicator of value because markets are too 'thin' (i.e. too few traders)

Hence, it is necessary to estimate or impute economic value of water

Major Imputed Water Valuation Techniques

1. REVEALED PREFERENCE TECHNIQUES
(based on observed market values)

Residual value

Marginal contribution of water to output, measured by subtracting all other costs from revenue (e.g. Cost of a Drink is RM5 – RM4 (all other costs) = RM1 (Cost of Water)

Production function approach

Marginal contribution measured as the change in output from a unit increase in water input in a given sector

Optimization models and programming

Marginal contribution measured as the change in sectoral output from reallocation of water across the entire economy

Hedonic pricing

Price differential paid for land with water resources

Opportunity Cost

Price differential for alternative (example: replacing hydroelectric power with coal-fired electricity)

2. STATED PREFERENCE
(based on surveys of willingness to pay)

Contingent Valuation Method

Survey of users, especially household water use and recreational services

Most commonly used water valuation techniques

	Frequency of water valuation studies	Most common methods used
Agriculture	Most common application	Residual value (and variations)
		Production function
		Programming models
Manufacturing	Uncommon	Production function, programming
Hydroelectric power	Common	Programming models, opportunity cost
Consumer good	Common	CVM, programming models
Waste assimilation services	Common	Cost of prevention, Benefits from damages averted

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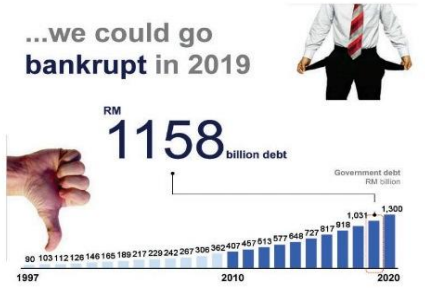
Water as a Social Good

IN MOST DEVELOPING COUNTRIES, INCLUDING MALAYSIA, ADJUSTMENT FOR SOCIETAL OBJECTIVES IS THE PRIORITY:

•For Domestic Water Consumption and Agricultural Sector (e.g. Padi), an adjustment is made for societal objectives (Government Responsibility) such as: government subsidy, poverty alleviation, employment and food security, ensuring access to all.

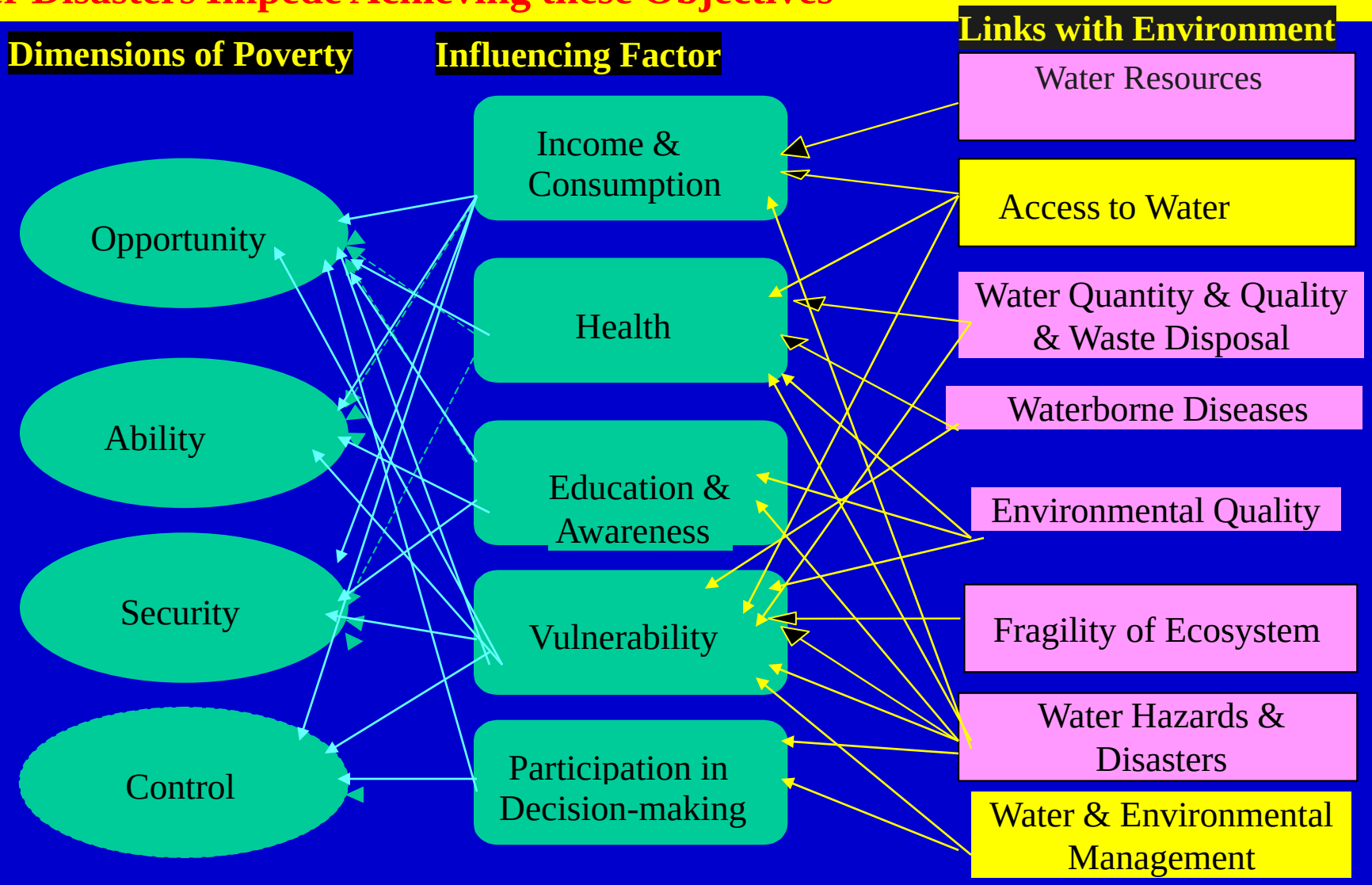
Government Subsidies

•Such adjustments are over and above the value of water to the user and should be added to reflect various the various societal objectives



•Extreme care must be taken in the use of these adjustments, with full consideration of the alternatives to meet these goals. *The estimates of these values are not to be arbitrarily set, but should be determined on the basis of the best available methods that give the real gains to the society from price differentials among sectors.*

Agenda 21: Chapter 3 (Combating Poverty), Chapter 4 (Changing Consumption Patterns) & Chapter 6 (Protecting Human Health) but Increased Incidence of Water Disasters Impede Achieving these Objectives



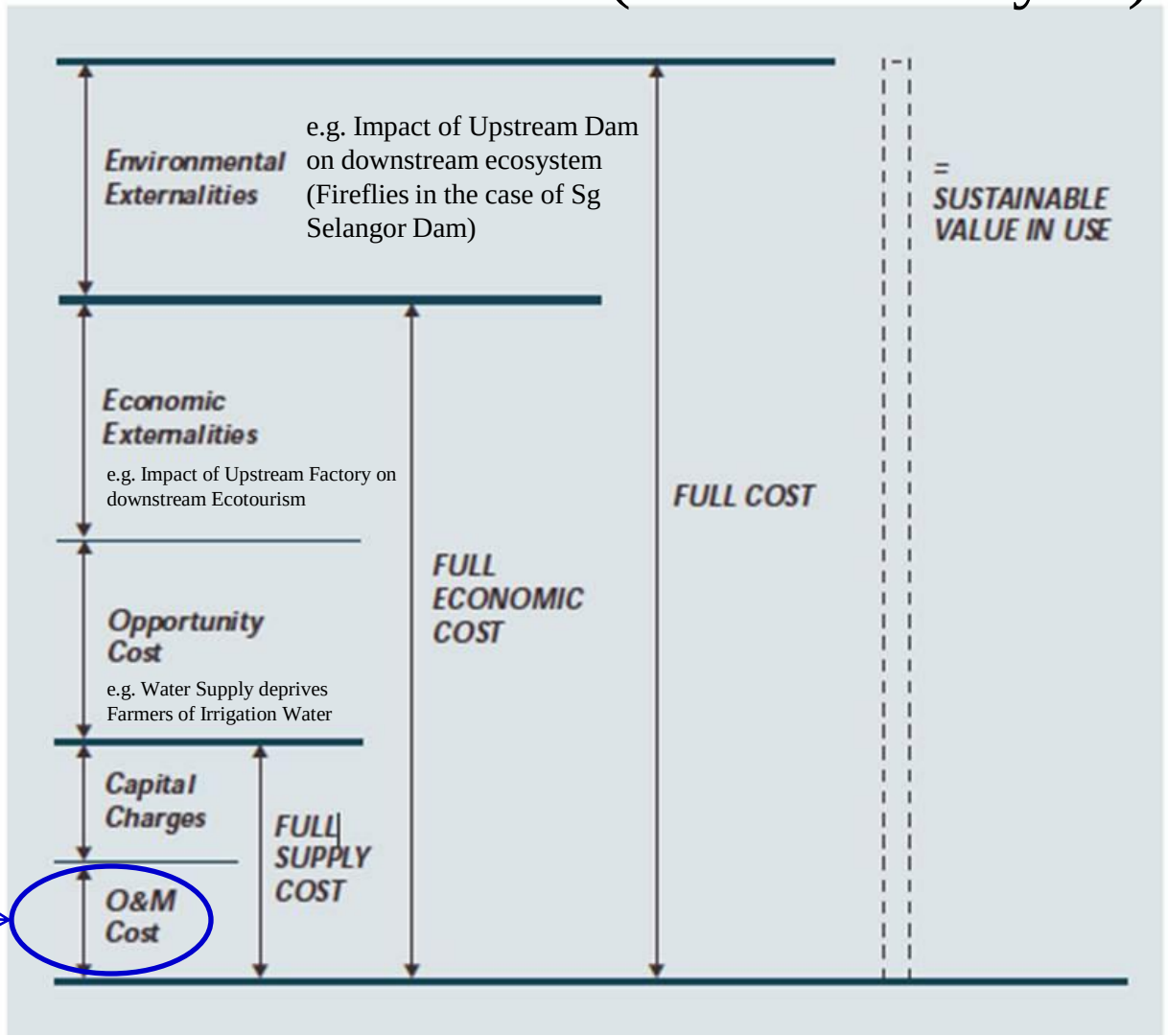
Violet = Links affected by Climate Change

Water as a Social Good (Case of Malaysia)

Components of Full Cost of Water

This Figure shows schematically the composition of the various components that add up to make the costs. There are 3 important concepts illustrated in this figure: (1) The Full Supply Cost; (2) The Full Economic Cost; and (3) The Full Cost

IN MALAYSIA, WE ARE TYPICALLY CHARGING ONLY THIS SECTION



Regardless of the method of estimation, the ideal for the sustainable use of water requires that the values and the costs should balance each other; full cost must equal the sustainable value in use (Source: *ROGERS, P. BHATIA, R. and HUBER, A.* (1998) ***Water as a Social and Economic Good: How to Put the Principle into Practice.*** ©Global Water Partnership/Swedish International Development Cooperation Agency S105-25 Stockholm, Sweden)

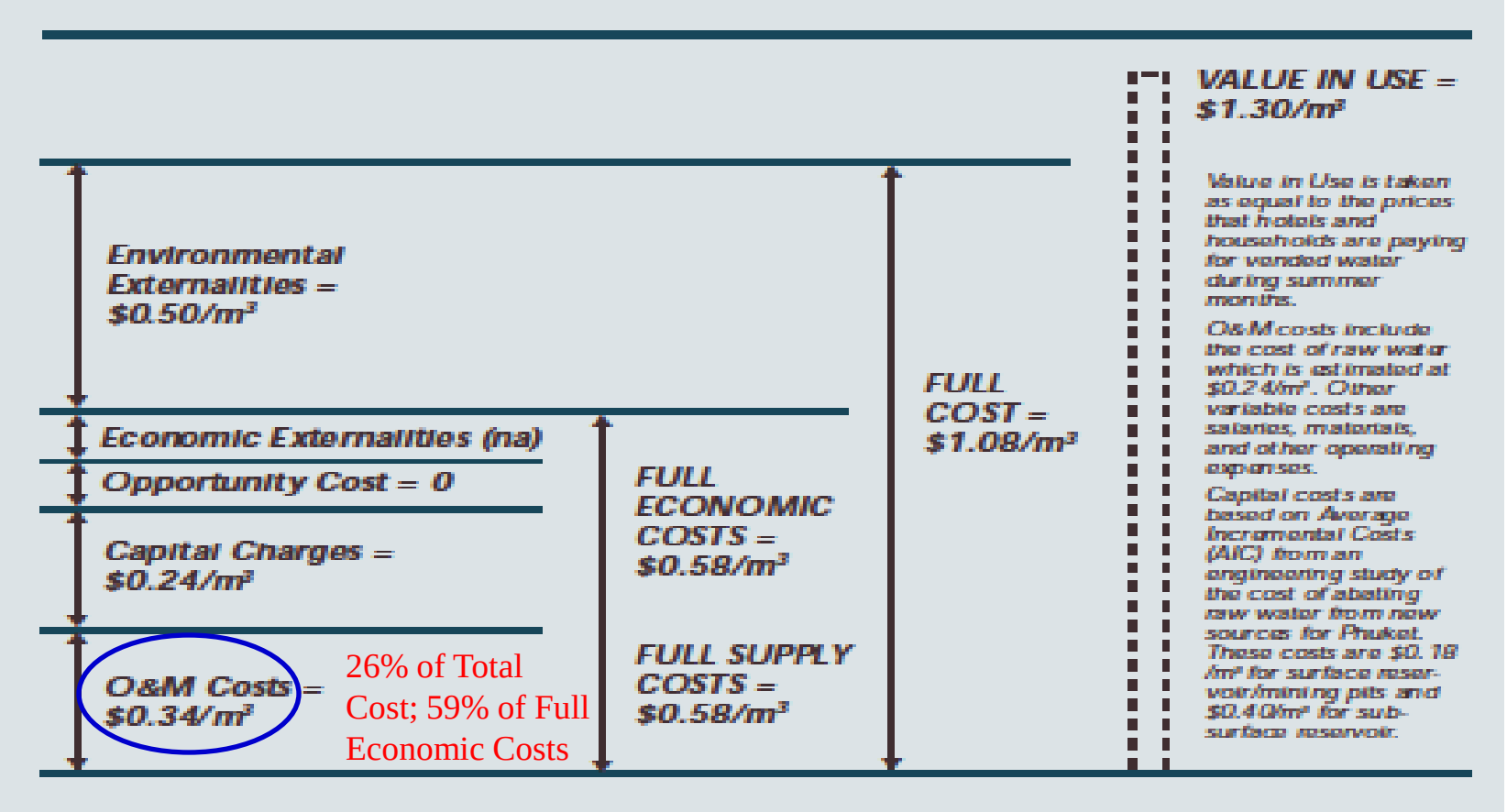


Figure 3. *Costs and Values for Urban Water Supply in Phuket, Thailand.*

Source: D. Rimsaiwat et al.: Full Cost Water and Wastewater Pricing: A Case Study of Phuket, Thailand; Thailand Development Research Institute, August 1995.

e.g. Penang – Domestic Tariff is averaged 22 sen/m^3 or 34% of the Cost of Production (O & M only) of 65 sen/m^3

The value of water

depends both upon the user and to the use to which it is put.

This Figure shows schematically the components of the Value in Use of water, which are the sum of the Economic and Intrinsic Values.

As shown in the figure, the components of Economic Value are:

- Value to Users of Water
- Net Benefits from Return Flows
- Net Benefits from Indirect Use
- Adjustments for Societal Objectives

(Source: *ROGERS, P. BHATIA, R. and HUBER, A.* (1998) ***Water as a Social and Economic Good: How to Put the Principle into Practice.*** ©Global Water Partnership/Swedish International Development Cooperation Agency S105-25 Stockholm, Sweden)

Water is largely a Social Good in Malaysia

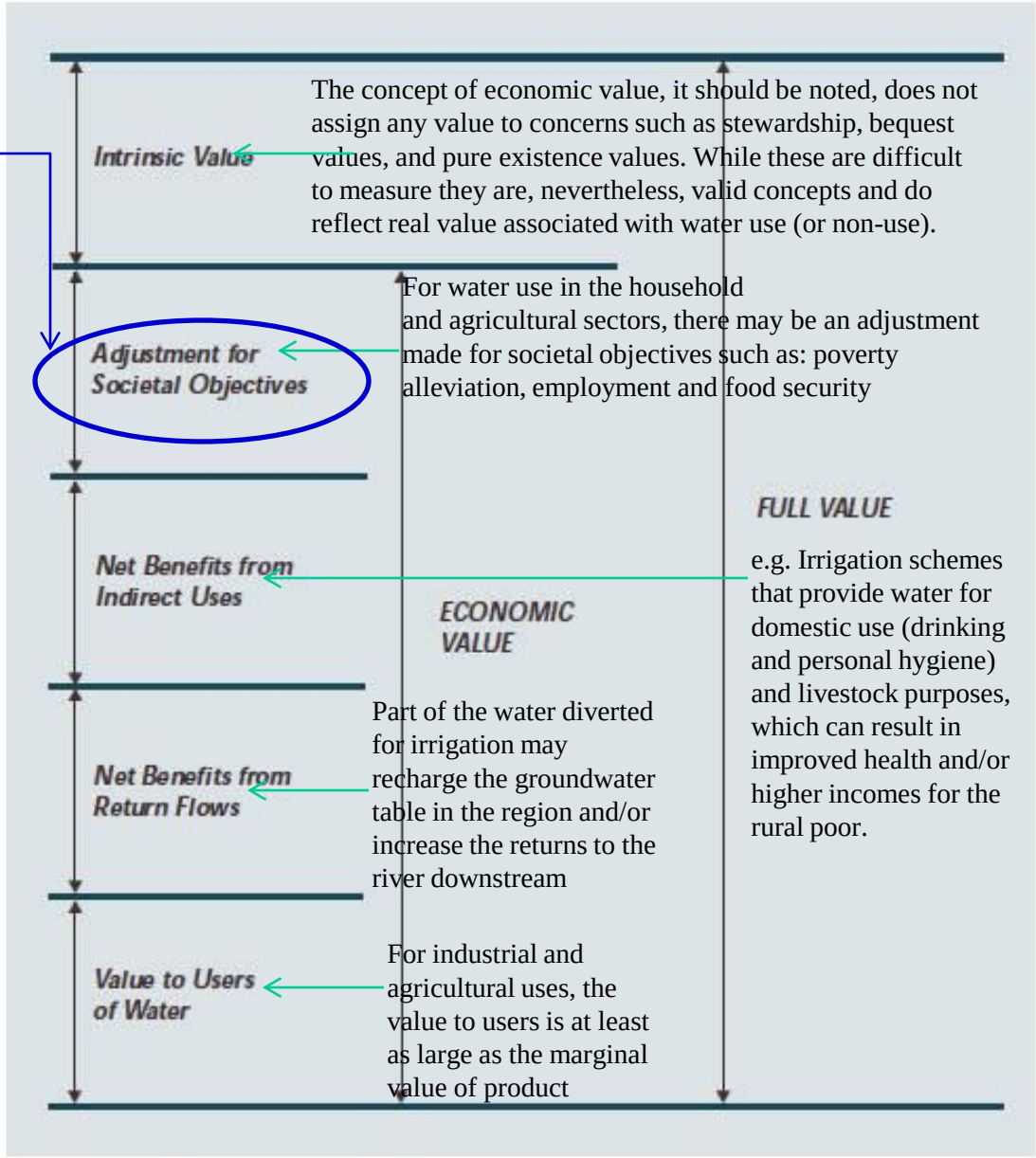


Figure 2. General Principles for Value in Use.

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Ecosystems products and services

Products

- Food
- Fuel wood
- Non-timber forest products
- Fisheries products
- Marine products
- Wetlands products
- Medicinal and biomedical products
- Forage and agricultural products
- **Water**
- Reeds
- Building material

Functions/Services

Hydrological services

- Purification of water
- Capture, storage and release of surface and groundwater
- Mitigation of floods and droughts

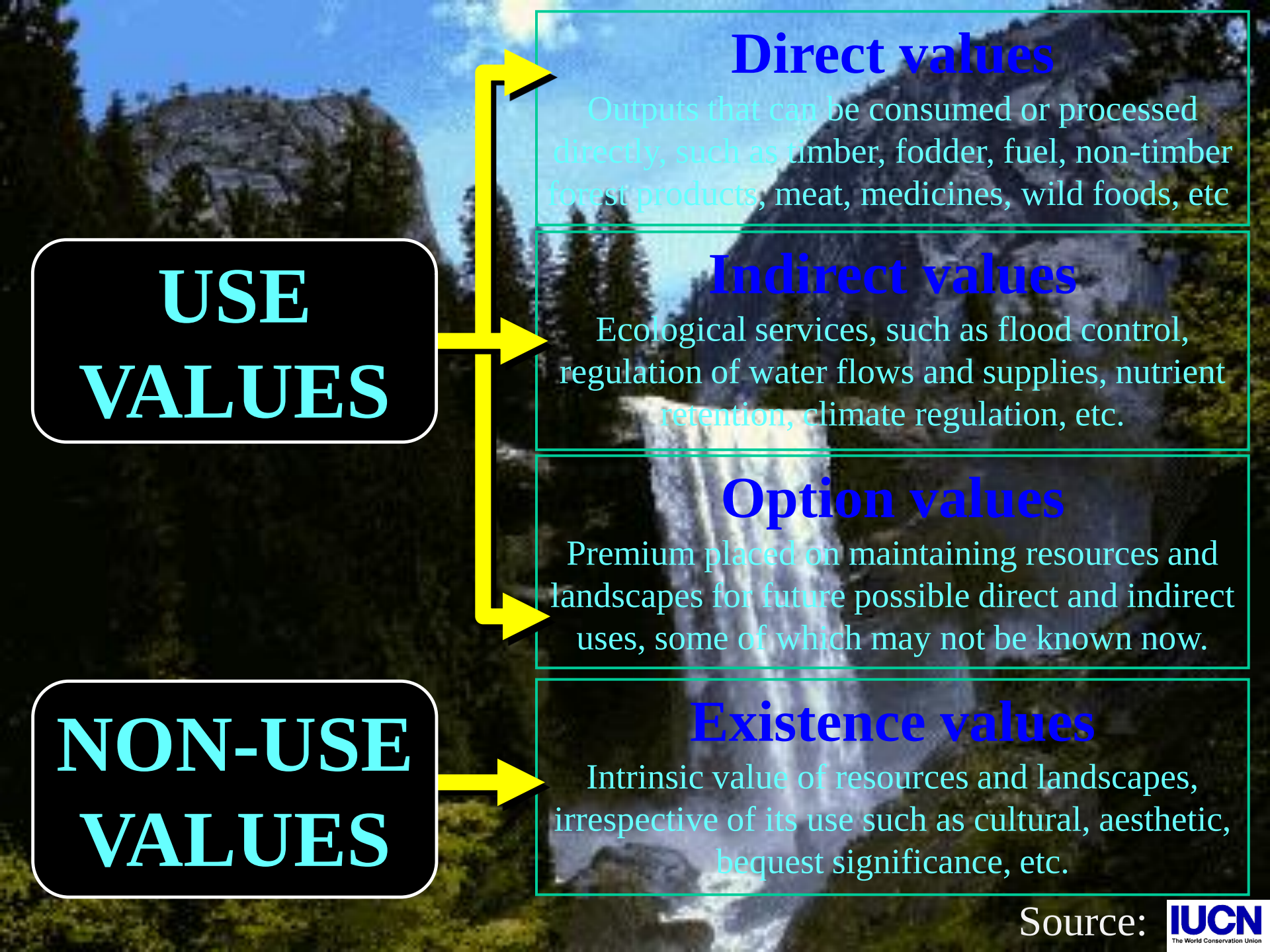
Biodiversity

- Maintenance of biodiversity (plants and animals)

Climate

- Partial stabilization of climate through carbon sequestration
- Moderation of temperature extremes and the force of winds and waves

Source: Adapted from Simpson (2001)



USE VALUES

NON-USE VALUES

Direct values

Outputs that can be consumed or processed directly, such as timber, fodder, fuel, non-timber forest products, meat, medicines, wild foods, etc

Indirect values

Ecological services, such as flood control, regulation of water flows and supplies, nutrient retention, climate regulation, etc.

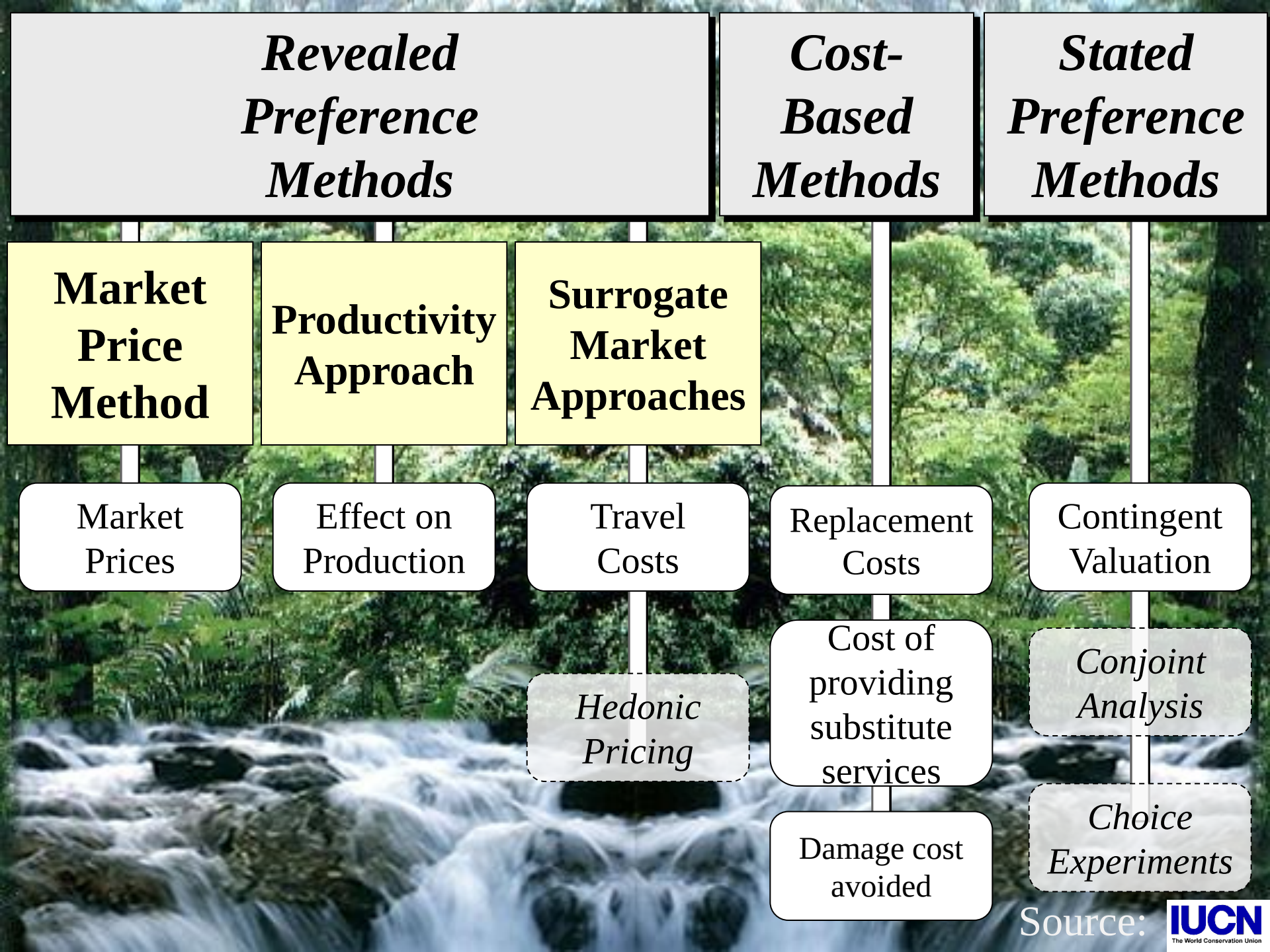
Option values

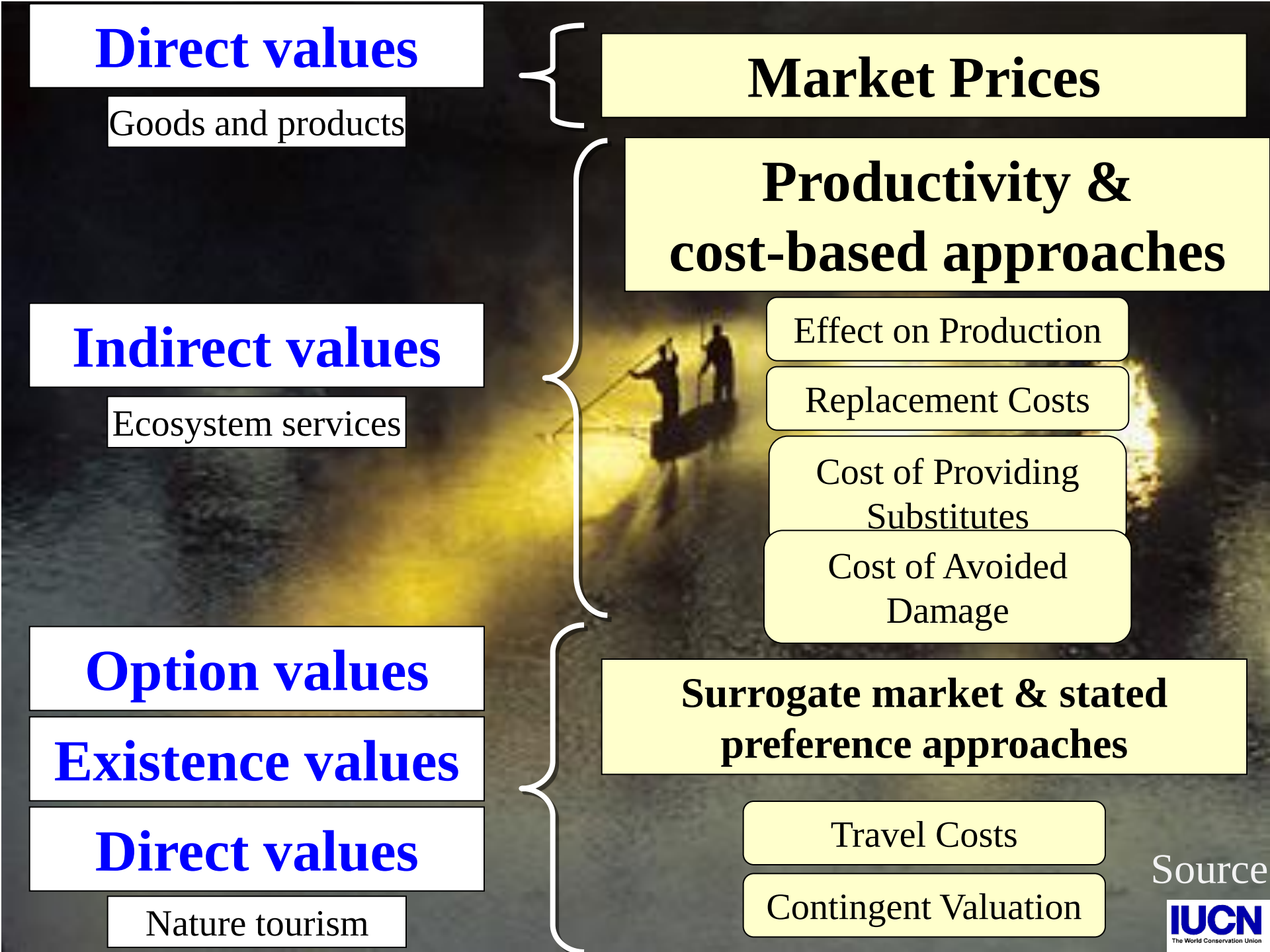
Premium placed on maintaining resources and landscapes for future possible direct and indirect uses, some of which may not be known now.

Existence values

Intrinsic value of resources and landscapes, irrespective of its use such as cultural, aesthetic, bequest significance, etc.

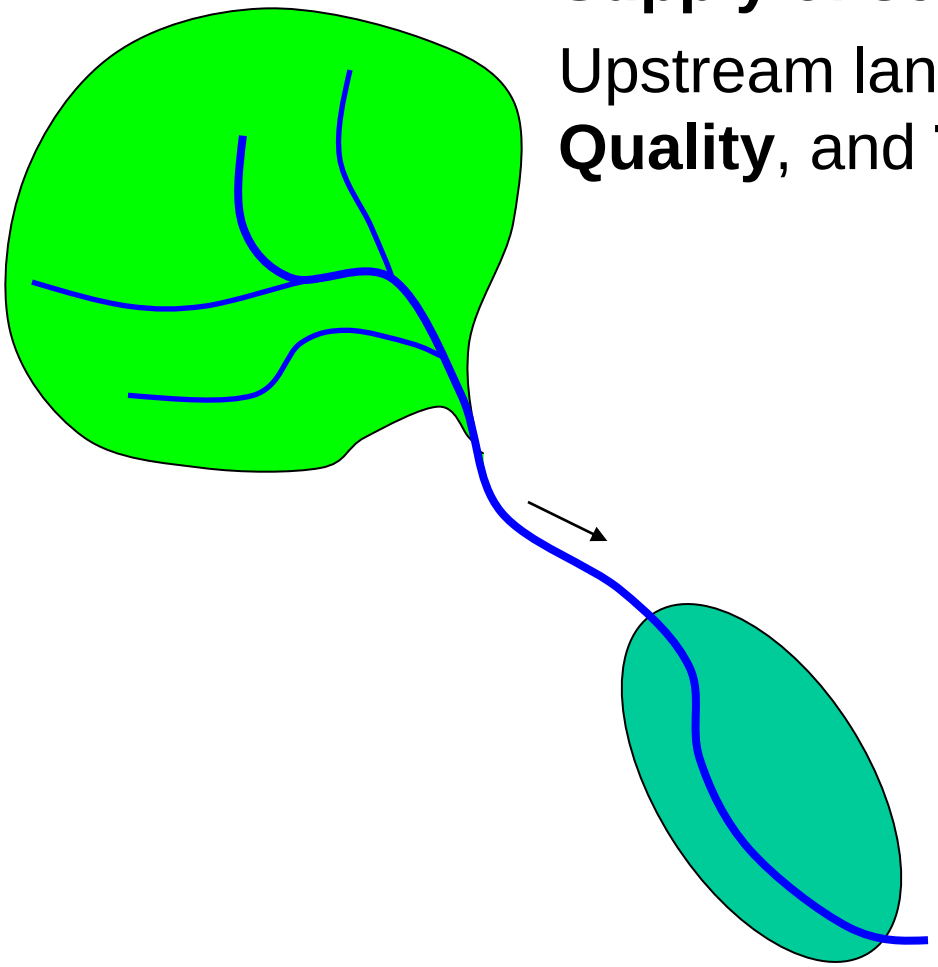
Source: IUCN The World Conservation Union


Revealed Preference Methods
Cost-Based Methods
Stated Preference Methods
Market Price Method
Productivity Approach
Surrogate Market Approaches
Market Prices
Effect on Production
Travel Costs
Replacement Costs
Contingent Valuation
Hedonic Pricing
Cost of providing substitute services
Conjoint Analysis
Damage cost avoided
Choice Experiments
Source:
IUCN
The World Conservation Union


Direct values
Goods and products
Market Prices
Productivity & cost-based approaches
Indirect values
Ecosystem services
Effect on Production
Replacement Costs
Cost of Providing Substitutes
Cost of Avoided Damage
Option values
Existence values
Direct values
Nature tourism
Surrogate market & stated preference approaches
Travel Costs
Contingent Valuation
Source
IUCN
The World Conservation Union

Application of economic valuation to water as an ecosystem good

Watershed services: supply and demand



Supply of services:

Upstream land uses affect the **Quantity**, **Quality**, and **Timing** of water flows

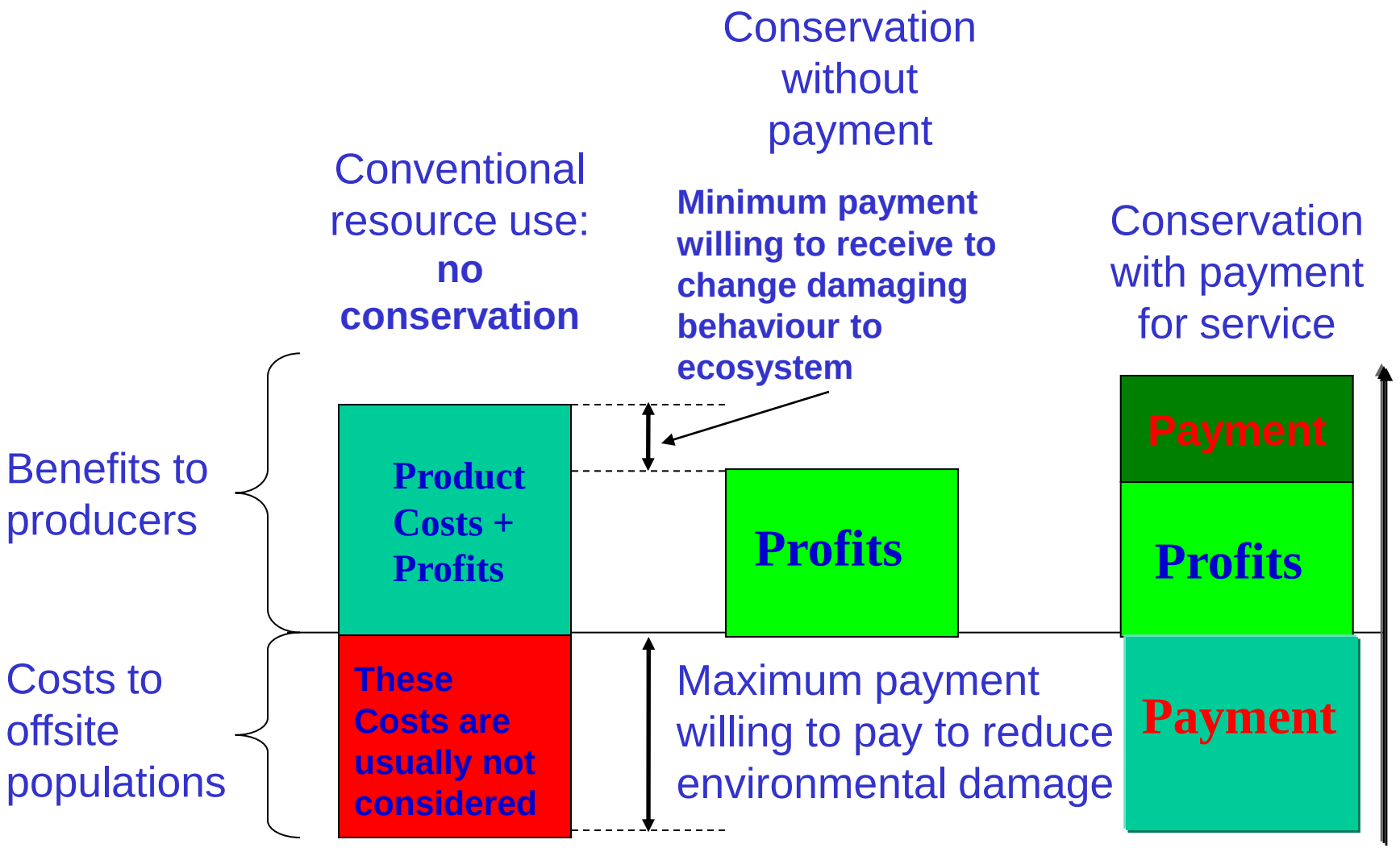
Demand for services:

Possible downstream beneficiaries:

- Domestic water use
- Irrigated agriculture
- Hydroelectric power
- Fisheries
- Recreation
- Downstream ecosystems

Source: World Bank 2003

Applying ecosystem valuation to payment for ecosystem service: simple in theory



Source: Adapted from World Bank 2002

In practice still not so simple…valuing effects of change in ecosystem conditions on agricultural production

Source: World Bank 2003

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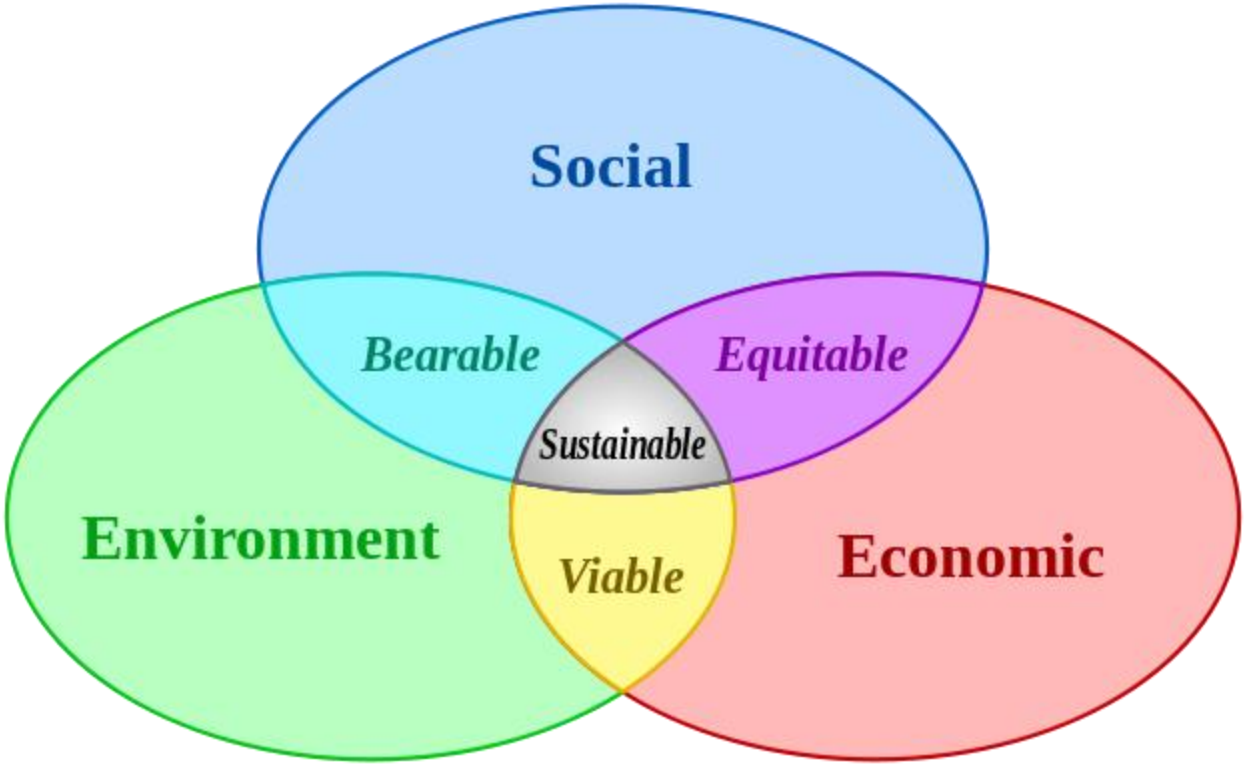
NEED TO BALANCE THE 3 PILLARS OF SUSTAINABLE DEVELOPMENT TO GIVE WATER ITS TRUE VALUE



Valuing Water is a Balancing Act

IUCN
The World Conservation Union

WE NEED A TARIFF STRUCTURE THAT TAKES INTO ACCOUNT ECONOMY, SOCIETY & ENVIRONMENT

- There should be NO FREE Water!
- Households using < 20 m^3 per month should be charged at Existing Rate (No Increase) – To Ensure the Poor are not Affected
- Beyond 20 m^3 per month, the rate should increase GEOMETRICALLY (1,2,4,8,16,32,64 etc) for every subsequent 10 m^3

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CONCLUSION

•Notwithstanding that “Water is Life” (meaning water is invaluable), it is not easy to give water value – The value of water should depend on the Context/Use

•No one is denying that Water Has a Vital Life-Giving Value – the only trouble is agreeing what that value is & how it is measured

•Economists may have developed many usable techniques to value water, but such valuations should always be done with SOCIAL, ENVIRONMENTAL & EQUITY designed into the valuation study from the start

•Ecosystem Service Valuation should also be included to give WATER a better value, e.g. the Production Function Analysis has potentials - yet it is rarely done.

Conclusion (continue)

- **FULL COST OF WATER should include the Opportunity Cost of water as well as the Environmental Externalities. The Full Cost should present the context for setting water prices, effluent charges, and incentives for pollution control.**

- **SOCIETAL OBJECTIVES - in estimating the value of water, it is critical to reflect societal objectives of poverty alleviation and food security, and incorporate the net benefits from return flows and non-irrigation uses of water.**

- **WATER TARIFFS – FULL COST RECOVERY IS IMMINENT, but tariff structure should penalise "Water Wasters" rather than the "Poor"**

- **ENSURING WATER SECURITY - Raising tariffs and encouraging water markets can play significant roles in improving Water Sector Efficiency and Environmental Sustainability of Water Resources.**

FINAL WORDS

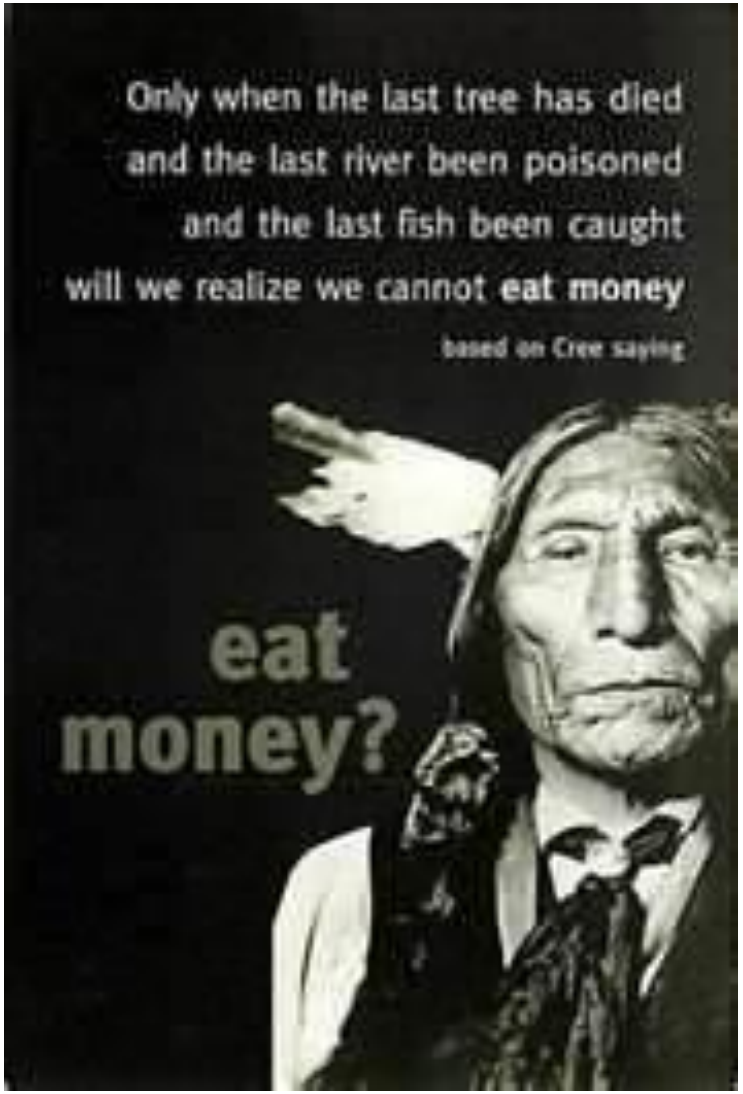
- Humans take water for granted due to its easy accessibility - The biggest irony is that while water is recognised as the most essential substance to sustain life, it is at the same time one of the most undervalued resources.

- Water Valuation or the value of water must surely include the almost infinite spectrum of services that water provides beyond what is needed for human use. The Human-centric approach that gives water value only when it is of use/value to humans must be discarded

- The value of water goes beyond Humans as it is essential for maintaining ecosystems & the environment, control desertification, combat global warming, stabilize weather systems & the list goes on.

- Water is also needed by flora and fauna, and is the habitat of aquatic life. It is an essential ingredient in the growth of all life forms.

- Hence, any valuation of water must include all the above to reflect its true value, failing which we would have undervalued water.


Only when the last tree has died
and the last river been poisoned
and the last fish been caught
will we realize we cannot eat money
based on Cree saying
eat
money?

TERIMA KASIH

By

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