



# GREEN ACCOUNTING



**Class -16**

7<sup>th</sup> November 2024

# National Income

- 1. Sum of final goods and services produced in the country during a given period*
- 2. The total output produced by the four factors of production*
- 3. Counted without duplication after having allowed for depreciation.*
- 4. The product of both public and private sectors*
- 5. Includes both consumption and capital goods sectors*
- 6. Takes into account net gain or the net loss of foreign trade*

**Why do we need to measure National Income ?**

# Measuring Indicators

**GNP**—Aggregate value of the all-final goods and services produced in a year in a country

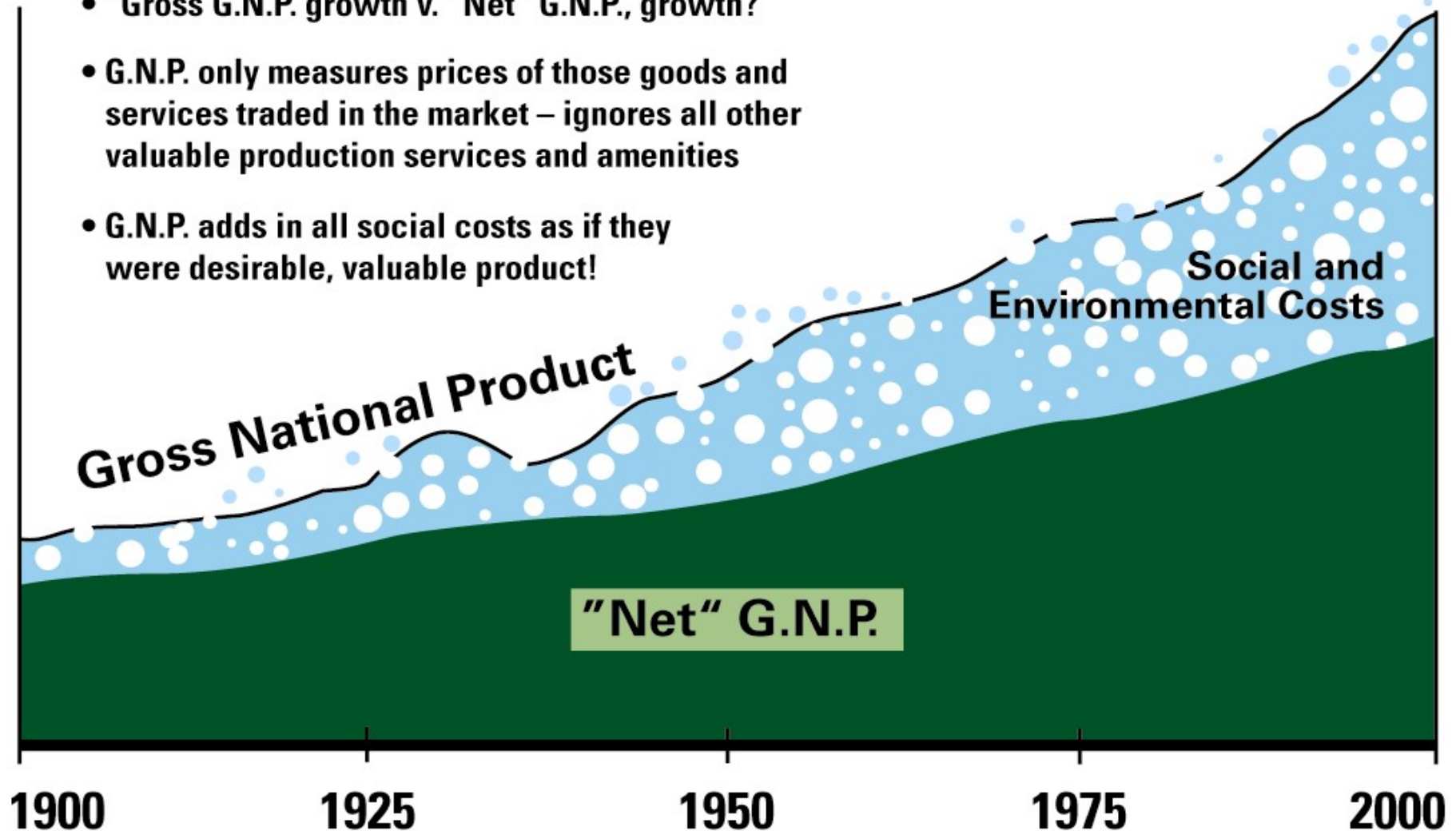
**NNP**—  $\text{GNP} - \text{Depreciation}$

**GDP**— GDP means the domestic income that has been generated over a year and measures production not sales.

**NDP**—  $\text{GDP} - \text{Depreciation}$

# Gross National Product Problems

- "Gross G.N.P. growth v. "Net" G.N.P., growth?
- G.N.P. only measures prices of those goods and services traded in the market – ignores all other valuable production services and amenities
- G.N.P. adds in all social costs as if they were desirable, valuable product!



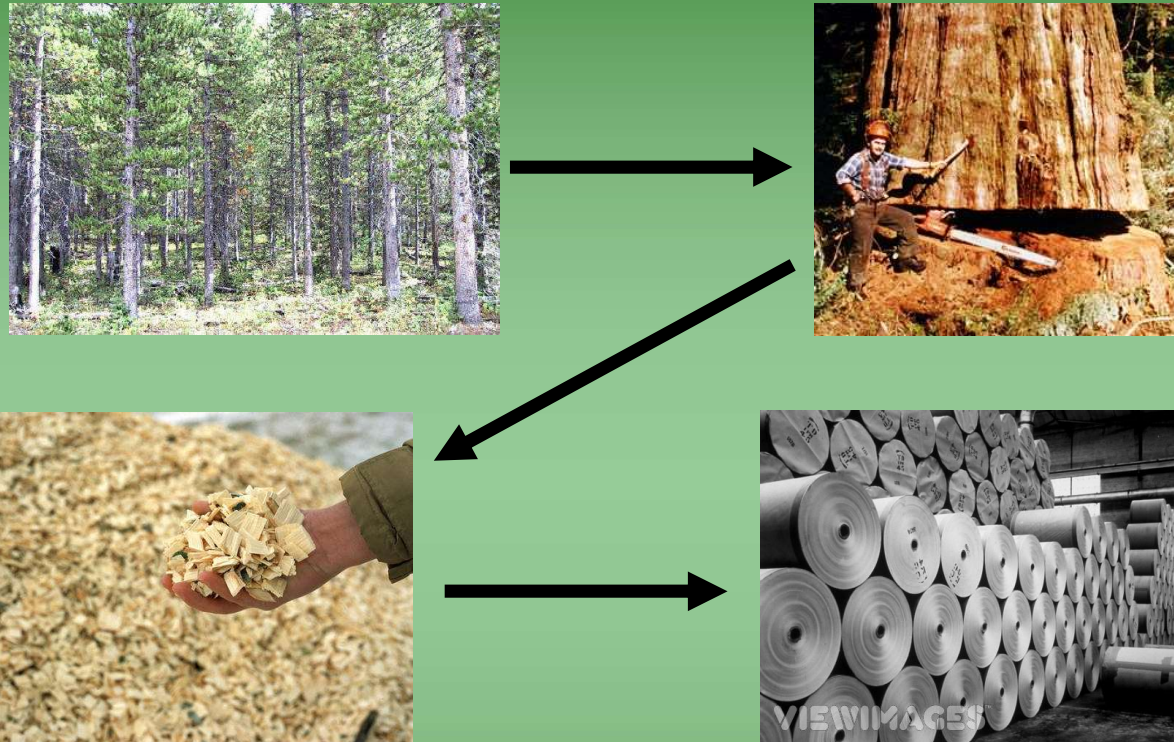
# GDP

- Depicts state of the economy of a country (or a region), that the authorities can use it to make decisions (*Samuelson and Nordhaus, 1995*)
- The System of National Accounts (SNA) of the world Bank uses GDP as a key measure of a country's progress (*does not count depletion*)
- Does not take into account - changes in the value of a nation's assets be they natural or human;
- law and order and quality of life are an excusable omission from national accounting
  - (*coal mining, grand parent services etc.,*).



# Unaccounted Services

*A tree growing in a forest has no standing in economics*



**No Transaction: No Existence**

**No Money: No Existence**

**No Value Judgments**

# Origin of Accounting

1930 - Official measure of US economy – Kuznets et al

1934 - Idea of National Account – first set of accounts

1940 – Value of intermediate products used were subtracted

1950 – Input-output tables were first utilized

1964 – BEA, concept of GDP

Environmental goods ? – Free ?

# System of National Accounts (SNA)

- Accounts compiled by Nation to track the economy
- SNA used to calculate indicators like GDP, GNP using standard format of UNSTAT
- National and International comparison (*ranks*) and decision making
- Basis for public policies for moving countries towards growth and development



# Standard National Accounts (SNA) framework

$$GNP = C + I + G + (X - M) + (R - P)$$

$$NNP = GNP - D$$

$$GDP = C + I + G + (X - M)$$

Where:

C = Consumption

I = Investment

D = Depreciation

X = Exports

M = Imports

R = Received, P = Paid

Misleadingly used as measure of welfare – Is it True?

# The SNA concept has remained so popular for so long for five reasons:

1. Importance of Economic Growth (*post war depression*)
2. No One Thought about the Environment
3. Dominance of the Market System (*ex.green house effect*)
4. Difficulty of Accounting for the Environment (*car vs nature*)
5. Difficulty in Introducing a New System (*satellite accounts*)

# Defects in SNA

Do not include the full economic value of environmental resources or the role which they play in productive activity.

Some of the elements missing from the accounts include:

- ✓ Environmental expenditures
- ✓ Non-marketed goods
- ✓ Non-marketed services
- ✓ Consumption of natural capital

# Issues with SNA

- Physical vs. monetary accounts
- Integrated accounts vs. satellite accounts
- Inclusion of "maintenance costs  
(defensive expenditures)"
- Valuation of non-marketed environmental  
services

# SEEA

The UN and the World Bank developed alternative macro-indicators for the accounting of environmentally adjusted GDP provided a conceptual basis for implementing green accounting, *i.e. the System of Integrated Economic and Environmental Accounting (SEEA)*

The SEEA (1993) expanded and complemented SNA with flow and stock accounts of natural resources in monetary units and for the calculation of environmental-adjusted GDP or **Green GDP**.

## Two main issues:

1. Requires the description of environment in physical terms (distinction –natural & man made)
2. Requires the valuation of natural assets.



# SEEA

## Contains:

- Physical flow accounts
  - Four kinds of flows
    - Products (produced economic sphere)
    - Natural resources (minerals, energy, soil, water, biological material)
    - Ecosystem inputs (support services)
    - Residuals (solid, effluent, emissions).
  - Two spheres
    - Economic
    - Environmental

# Economic and Environmental assets

- *Economic assets* supply the economy with natural resources or raw materials for use in production and consumption processes.

As per 1993 SNA, the *economic assets* include all those natural assets

- (a) over which ownership rights are enforced by institutional units, individually or collectively, and
- (b) from which economic benefits may be derived.

- Natural assets can be produced (agricultural crops), or non-produced (land, mineral deposits, fish in lakes or the ocean).

## *Environmental Assets*

All those *non-produced, non-economic natural assets* that function as providers

not of natural resource inputs into production

but of environmental services of waste absorption, ecological functions (eg. habitat and flood and climate control), or other non-economic amenities ( health and aesthetic values)

# SEEA

## Contains:

- Environmental protection and resource management accounts
  - Disaggregation of data from the conventional accounts on environmental protection expenditures
    - E.g. Pollution prevention, management of natural resources
    - Can view where environmental costs are the highest – compared to economic output

# SEEA

## Contains:

- Natural resource asset accounts
  - Both physical and monetary
  - Excludes many ecosystem services
  - Accumulation accounts, balance sheets
    - State at time  $t$ , again at time  $t+1$
  - Fisheries, forestry, water, subsoil, land
  - Critique: difficult to do when market prices do not exist



# SEEA

## Contains:

- Environmentally adjusted asset accounts
  - Combining the metrics  
MEW and ISEW (now called as GPI-genuine progress indicator) – include value of household work and nonmarket activities
  - Subtracting loss in natural resources and damage to the environment from conventional income

# Classification of natural assets

- Asset boundaries of both SEEA and SNA, in respect of cultivated assets and sub-soil assets are same.
- *Air is included only in SEEA* and not in SNA.
- SNA land includes - water surfaces such as lakes and rivers and in some instances also ground water.
- *SEEA excludes these categories from land but includes them under Water. SEEA land includes ecosystems.*
- SNA water resource is restricted to aquifers.

# Valuation of Natural Resources and Environmental Impacts

- Only *economic natural assets* are valued in monetary terms in SNA.
- In SEEA the depletion of economic natural assets is taken as cost in the Production Account. As such costs are not accounted in budgets ,they are taken as Social costs.
- SEEA attempts to put monetary value on such Social costs using three alternative approaches:
  - (a)Market Valuation (Net present value/Net price/User cost)
  - (b)Maintenance Valuation,
  - (c)Contingent Valuation (survey based)

The importance of integrating environmental degradation and resource consumption into economic accounting system has been noticed by the international world.

The UN and other international organizations studied the experience of economic accounting, and compiled the SEEA, and *introduced green accounting to the world* with theoretical and technical guidance.

In recent years, over than 20 countries including Mexico, the U.S., EU, Japan, Norway, Mexico, Philippines, and Indonesia etc. performed green accounting with respect to different environmental concerns based on various theories and methodologies.

# GDP and Green Accounting

While GDP is used as the most important index to measure economic growth. The rapidness of the GDP growth is at the cost of severe environmental degradation and over consumption of resources.

One of the attempts to tackle this problem is to set up a green accounting system and may be considered as two-fold:

*It can be used to inform the government and public, how much has been expended in environmental degradation and resource depletion when the high GDP growth rate has been kept, and*

*it alerts that it might not be appropriate to use **GDP** as the predominant indicator of the government achievement.*



Also some environmental goods are not marketed though they provide economic value.

*Ex: Fuel wood gathered in forests, meat and fish gathered for consumption, and medicinal plants, drinking and irrigation water, whose sale prices reflect the cost of distribution and treatment infrastructure, but not the water itself*

*Valuing environmental services such as the watershed protection that forests afford and the crop fertilization that insects provide is difficult.*

Though some experts call for their inclusion in environmentally adjusted accounts, typically neither the economic value nor the degradation of these services<sub>24</sub> is included.

National income accounts treat the depreciation of manufactured capital and natural capital differently

Physical capital

—a building or a machine, for instance—is depreciated in accordance with conventional business accounting principles,

while all consumption of Natural capital is accounted for as income. Thus the accounts of a country that harvests its forests unsustainably will show high income for a few years, but will not reflect the destruction of the productive forest asset

# Green Accounting

Green accounting" - sometimes referred to as "*Environmental accounting*", "*resource accounting*" or "*integrated economic and environmental accounting*" - refers to modification of the SNA to incorporate the use or depletion of natural resources.



*Lutz and El Serafy – first to conduct research on GA (1988)*

# Green Accounting

Integration of Economics and Environment

(since the 1960s ; flaws in SNA – *environ protection*)

Tool for understanding the role of the natural environment in the economy and study the relation between economic development and environmental resources.

Is accounting theory and method which combine natural environment with accounting and adopt pluralistic measurement means and attribute, based on relevant environmental laws and regulations

# Elements of Green Accounting

- Environmental services
  - Ecosystem life support systems
  - Landscape
- Environmental damages
  - Pollution flows e.g air & water quality
- Defensive expenditures
  - e.g. fencing around NP
- Resource depletion
  - Non-renewables; renewables



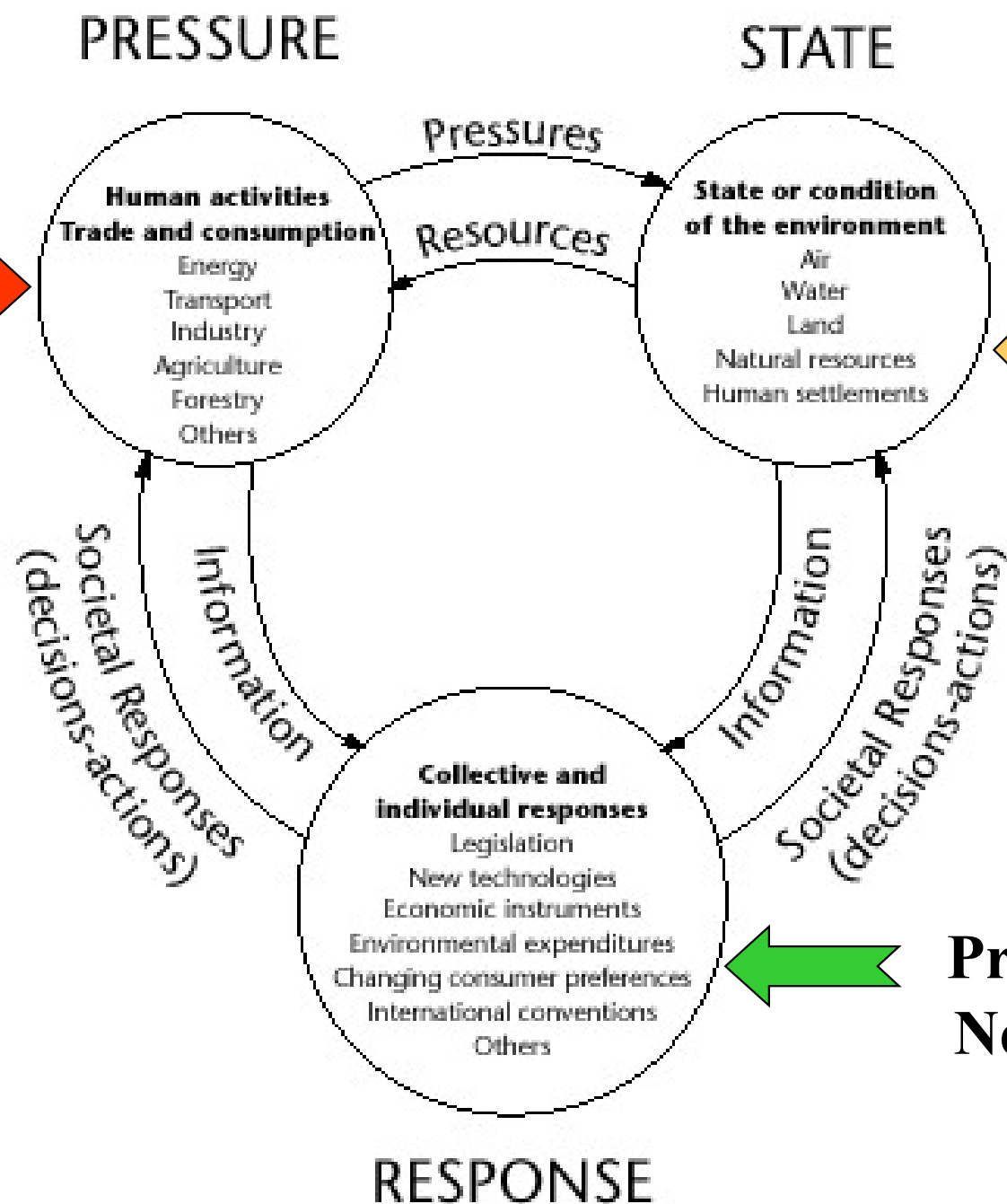
# Green accounting – Rationale

“The effect of mankind’s activity upon the environment has been an important policy issue throughout the last part of the twentieth century

growing concern about the impact of each country’s economic activity upon the global and local environment...

increasing recognition that continuing economic growth and human welfare are dependent upon the services provided by the environment”

**Human  
Activities  
that  
Influence  
the  
environment**



**Condition  
of the  
Environment**

**Response to  
Prevent / Reduce  
Negative Impact**

# History

Norway (1970) - data on energy sources, **fisheries, forests, and minerals** to address resource scarcity and over time, expanded their accounts to include data on air pollutant emissions.

“Wasting Assets”: Study by Robert Repetto *et al* (1989) at the WRI on Natural Resources in the National Income Accounts,” estimated the depreciation of **Indonesia’s** forests, petroleum reserves, and soil assets.(GDP sank)

*Brake – against green GDP*

**Philippines** (1990). The approach used is to build all economic inputs and outputs into the accounts, including non-marketed goods and services of the environment like gathering fuel wood and the waste disposal services provided by air, water, and land

US – BEA-Mineral sectors – political controversy

**Namibia** (1994) began work on resource accounts in, addressing questions as whether the government has been able to capture rents from the minerals and fisheries sectors,

how to allocate scarce water supplies, and  
how rangeland degradation affects the value of  
livestock.

The **Netherlands** routinely constructs the "National Accounting Matrix Including Environmental Accounts" (NAMEA), an extended form of the national accounts input/output matrix which tracks pollution emissions by economic sector. These data are used to track how far the country is from its environmental protection objectives.

**Chile's** Central Bank undertook to develop environmental accounts focusing on the forest and minerals sectors. Their work suggested that the country's forest-based development strategy may not be sustainable

**Costa Rica** undertook a forest depletion exercise similar to that of Indonesia

# Value of non-marketed environmental goods and services

- ❑ Controversy exists - to include non-marketed environmental goods and services in environmental accounts, such as the benefits of an unpolluted lake or a scenic vista.
- ❑ On the one hand, the value of these items is crucial if the accounts are to be used to assess tradeoffs between economic and environmental goals. Otherwise, the accounts can end up reflecting the costs of protecting the environment without in any way reflecting the benefits.

# Environmental valuation methodologies

## **Direct market approach**

Market Price Method

Productivity Methods

Damage Cost Avoided, Replacement Cost, and  
Substitute Cost Methods

## **Surrogate market approach (proxy)**

Travel cost approach (*ex. Recreational sites*)

Hedonic pricing (*ex. house location*)

## **Hypothetical market approach**

WTP

# Sustainable Development

The United Nations Conference for the Environment, (Rio de Janeiro, in 1972) used for the first time the term sustainable development

Holistic Development without conceptual frame work - Absurd

*“You can't manage what you can't measure”*

Pavan Sukhdev, GIST

National wealth is not only physical capital but should include natural capital, human capital, social capital.

Sustainable growth should increase per-capita income

Meet the concept of Ecological Footprint

How to measure national wealth in order to grow it in a sustainable manner?



# To What Extent Green Accounting Measure Sustainable Development

## Green Accounting

Creates indicator to measures sustainable development



*"Economic and social development that meets the needs of the current generation without undermining the ability of future generations to meet their own needs" – WCED (1987)*



Derive indicators that could tell us whether or not an economy is sustainable and,

With Characteristics – Policy relevance, Analytically sound and Measurable

## Sustainable development has to be more specifically defined

- ✓ Economics, for example, propose to define sustainable development as “*non-declining human well-being over time*”
- ✓ The clearer the definition used, the easier would be the task of devising the relevant indicators
- ✓ An indicator could tell us directly, and straightforwardly, whether the economy is on a non-declining welfare path, a sustainable path.

➤ When Environmental sustainability is addressed?  
*(when attempting to place values on environ resources)*

➤ there are two core concepts -Strong and Weak

➤ What is basic concept of sustainability?  
(Resource consumption....)

Weak is more applicable to green accounting and  
to fixing the flaws of GDP

## **Strong sustainability**

Followed by ecologist and ecological economists. Natural assets do not have substitutes and that all the natural assets should be preserved.

Save as much of it as possible and to invest the economic capital in different often renewable environmental resource

Strictly focuses on maintaining natural capital. The conservationist movement is an example of SS

## **Weak sustainability**

Neoclassical economists, focuses on sustaining capital

Weak sustainability rule states *that as long as total stock of capital is non-declining i.e. it does not matter*

# Weak Sustainability

- Weak sustainability
  - Contain the sum of man-made and natural capital
    - Sum non-declining
    - Requires pricing of natural capital
  - Assumes substitutability between man-made and natural capital
  - Depletion of natural capital can be offset by creation of man-made capital
  - “Consumption may be held constant in the face of exhaustible resources only if the rents deriving from the inter-temporally efficient use of those resources are reinvested in the reproducible capital.” (Hartwick rule)”

# Hicksian income and GA

John R. Hick's concept of income exemplifies the idea of sustainability

He defines an individual's income as *“the max value which he can consume during a week and still expect to be as well off in the end of the week as he was in the beginning”* (1946), this is often used as basis for green accounting

Hicksian income and GA are interrelated because of their focus on sustaining economic capital

SS focuses on investing capital in renewable environmental resources while WS focuses on investing capital in any way.

GA conforms to WS because investing capital in any form is more feasible than only investing in a renewable environmental resource.

GA helps to set a value on environmental resources and fixes the SNA so that the impact of economic growth on resource use and depletion is properly understood.

# Limitations of Green Accounting

There is no standard accounting method.  
(comparison between two firms or countries is not possible if method of accounting is different)

Input of EA is not easily available because costs and benefits relevant to the environment are not easily measurable



while it is possible to value a tree in terms of its potential source as timber, no calculation could be made for that tree as part of a rain forest in which it is home for a variety of wildlife

how can we put a value on an ecosystem about which we may know very little (*ex. medicinal plants*)

if we could put a value on nature, would the environment be better off?

*economists know the price of everything and the value of nothing ----- Keith Suter*

*Is nature for man or man for nature????*