The environment and the economic system

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Agenda

2.1 Economy-environment interdependence

2.2 The drivers of environmental impact

2.3 Poverty and inequality

2.4 Limits to growth?

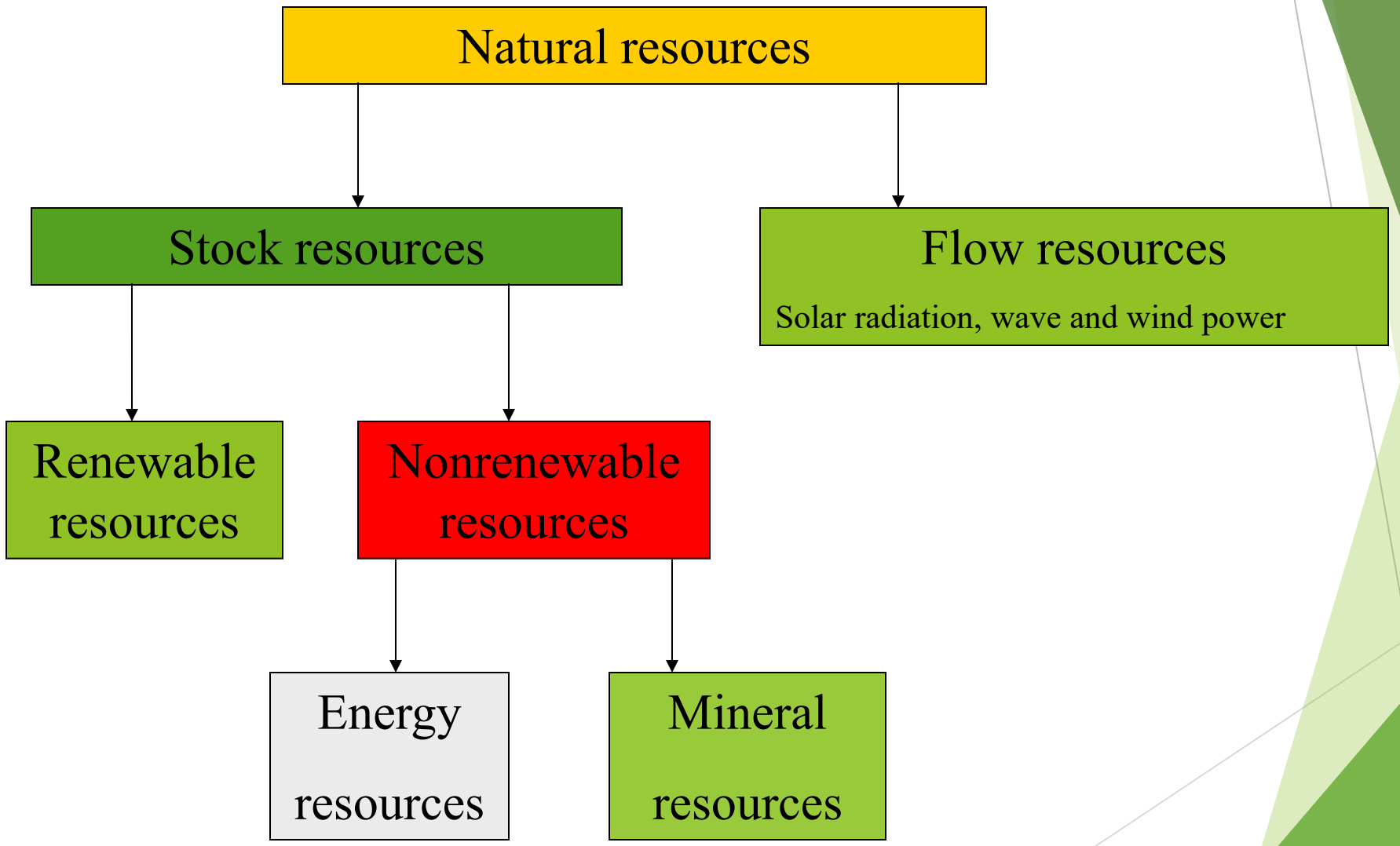
2.5 The pursuit of sustainable development

'The global challenge can be simply stated: To reach sustainability, humanity must increase the consumption levels of the world's poor, while at the same time reducing humanity's ecological footprint.' (Meadows et al 2005)

Economy–environment interdependence

- Economic activities take place within and are part of a system that includes the Earth and its atmosphere.
- We call this system ‘the natural environment’ or ‘the environment’.
- This system itself has an environment, which is the rest of the universe.

Classification of natural resources



Classification of natural resources

- Natural resources as stock or as flow resources.
  - Flow resources:
    - no link between current use and future availability
    - e.g. solar radiation, wave and wind power
  - Stock resources:
    - level of current use does affect future availability
    - e.g. forests, minerals
    - Renewable resources are biotic populations – flora and fauna – that have the potential to grow by natural reproduction.
    - Non-renewable resources are minerals, including fossil fuels: with no natural reproduction, except on geological timescales.

Distinction between fossil fuels and other minerals is important.

1. The use of fossil fuels is pervasive in industrial economies and is one of their essential distinguishing characteristics.
2. Fossil fuel combustion is an irreversible process in that there is no way in which the input fuel can be even partially recovered after combustion.
   - As coal, oil, and gas are used to produce heat, rather than as inputs to chemical processes, they cannot be recycled.
   - Minerals used as inputs to production can be recycled.
   - This means that whereas in the case of minerals, there exists the possibility of delaying, for a given use rate, the date of exhaustion of a given initial stock, in the case of fossil fuels there does not.
3. Third, fossil fuel combustion is a major source of many waste emissions, especially into the atmosphere e.g., CO_2.

Economy-environment interdependence

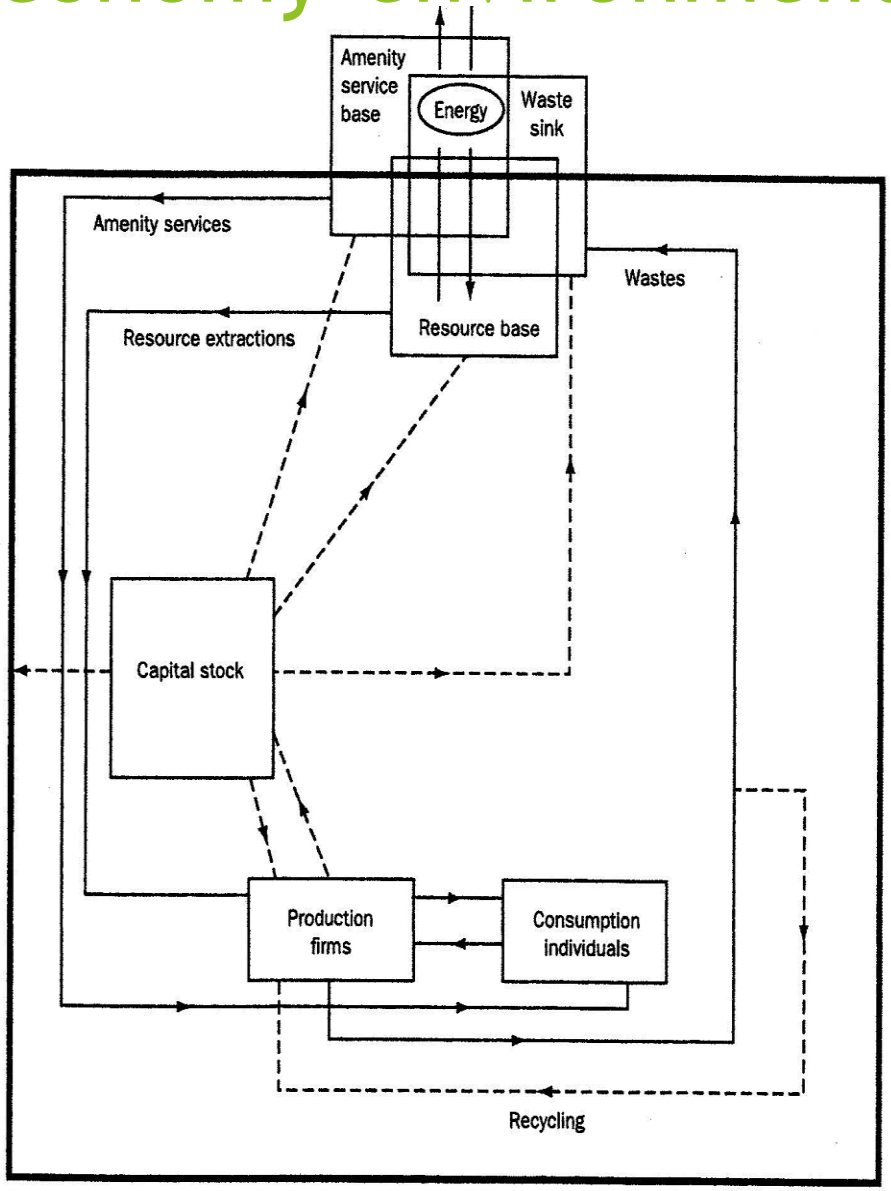


Figure 2.1 Economic activity in the natural environment Perman et al. 2003

The environment is a closed system, exchanging energy (but not matter) with its environment.

The economy is located within the environment.

The environment provides four functions to the economy

1. source of resource inputs
2. source of amenity services
3. receptacle for wastes
4. provides **life support services**

There exist possibilities to substitute reproducible capital for 'natural capital'.

Substituting for environmental services

- The dashed lines represent possibilities of substitutions for environmental services.

- Recycling substitutes for environmental functions in two ways.
  - First, it reduces the demands made upon the waste sink function.
  - Second, it reduces the demands made upon the resource base function, in so far as recycled materials are substituted for extractions from the environment.

- There are four dashed lines from the box for capital running to the three boxes and the heavy black line representing environmental functions.
  - These lines are to represent possibilities for substituting the services of reproducible capital for environmental services or “natural” capital services.

Human capital

- ‘Human capital’ forms the basis for technical change.
- It increases when current production is used to increase knowledge
- However, increased knowledge impacts economic activity, only if
  - it is embodied in new more efficient equipment or technology
  - that is capable of substituting for environmental functions