**Environmental Economics** is the study of how to make the best decisions that involve or affect the environment, the economy, and the inter-relationship between the two.

- It involves **economists extending their discipline and its paradigms to address environmental issues**.
- It deals with **questions of excessive pollution by the market**, or **insufficient protection of the natural environment due to market failure**.

**Lead positioning** such as what happened in **Flint, Michigan** otherwise known as '**Buick City**,' the **coral bleaching** suffered by the **Great Barrier Reef** and **air pollution** are all example of the need for **Environmental Economics** to be studied.

The **economy tends to have an effect on the environment** whereby **environmental issues worsen with economic growth** until average income reaches a point after which environmental quality tends to improve.

- This is represented by the **Kuznets Curve**.

The **environment also has an impact on the economy**, especially **tourism** as is the case with the Great Barrier Reef.

The need to **understand linkages between the environment and the economy** is increasing as factors such as **population growth** and **increasing resource scarcities** are placing greater strain on this relationship.

Economics is able to contribute to **environmental policy-making** by helping to understand:

- **How to value?** Whilst prices reflect the relative scarcity of goods it can be **difficult to value non-market goods** as they are not traded.
- **How much to regulate?** **Trade-offs exist between environmental quality and growth** meaning that the **socially desirable amount** of pollution is probably not 0. Markets often will not produce the socially desirable amount on their own with their failure providing the rationale for **government intervention**.
- **What is effective regulation?** **Standards**, **taxes**, **tariffs**, **voluntary measures** may reduce the impact of pollution though it is important to create the **right incentives at minimal cost**.
- **What is equitable and what are the distributional impacts?**

**Brown Issues** relate to pollution. They include **air pollution**, **water pollution** and **chemical pollution**.

**Green Issues** relate to ecosystem services. They include **ecosystems** and **natural environments**.

The two main questions relating to pollution are **what is the right amount of pollution** and **how do we get polluters to control their emissions**.

**Emissions** are the flow of a pollutant.

**Assimilative Capacity** is the ability of the environment to absorb or process pollutants.

**Stock Pollutants** are those for which the environment has an effectively zero ability to assimilated.

- For example **dioxins**, **radioactive wastes**, and **plastics**.

**Funds Pollutants** are those for which the environment has some ability to assimilate.

- For example **organic wastes** and **phosphorus**, and **carbon dioxide** and **methane** to a limit.

A **Point Source** is any single identifiable source from which pollutants are discharged.

- For example a **pipe**, **ditch**, **ship**, or **factory smokestack**.

A **Non-point Source** is many diffuse sources.

- For example **land runoff**, **precipitation**, and **drainage**.

Determining the **right amount of pollution** includes **assessing damages** from pollution and the **cost of abatement**.

- **Air pollution** for example causes physical irritation, reduced visibility, stress about adverse health effects, increased susceptibility to illness and increased illness, and increase in money spent on methods to improve air quality (e.g. filters)and protectants (e.g. masks).

The **shape of the damage function** is important as it could be **linear**, **exponential**, or even have a **threshold** at which point environment costs/damage dramatically increase.

- There are always **uncertainties** therefore the importance of accurate forecasting and modelling.

**Pollution abatement** may include end of pipe treatment, modifying the production process, modifying the product characteristics, relocating production activities, or buying permits to emit pollution where possible.

**Positive Economics** explains what we see in the economy with facts and little controversy.

- For example an increase in sunny weather leads to a rise in demand for sunscreen, and a rise in oil prices will increase the numbers of individuals cycling to work.

**Normative Economics** explains how we wish the economy would allocate goods and services. It involves value judgements and controversy.

- For example resources are best allocated by allowing the market to work freely, and pollution is the most serious economic problem.

Environmental economics builds upon **theories of consumers, firms, and market interactions**.

**Environmental economics is not Ecological Economics** which on the other hand relies upon scientists from interdisciplinary fields who extend their disciplines to consider the economy.

**Environmental economics is not Resource Economics** which on the other hand is concerned with production and use of natural resources both **renewable** (**fisheries**, **forests**) and **exhaustible** (**energy**, **minerals**).

**Markets** are exchange institutions, which subject to certain economic conditions ensure the efficient organisation of economic activity.

- **Adam Smith's 'Invisible Hand' Theory** states that free markets engaged in **free exchange** achieve what is best for society.
- Markets can **fail** if prices do not communicate society's desires and constraints accurately.

**Market Failure** occurs when prices do not communicate society's desires and constraints accurately.

- Private decisions based on these prices do not generate a **social welfare** maximising allocation of resources.

The **First Theorem of Welfare Economics** is that markets will result in **Pareto optimal allocation** of resources if a complete set of markets exists with **well-defined property rights**.

- **Pareto Optimality/Efficiency** exists when it is impossible to make one person better off without worsening the position of another.

**Property Rights** are a set of institutions which define the rights and limitations of ownership. The power of property rights vary, however generally if someone owns the rights to a resource they are responsible for its costs and benefits.

- **Government policy** changes the nature of institutions, and so may change the nature of property rights.
- Well-defined property rights are:
  - **Exclusive** meaning that all benefits and costs accrue only to the owners directly, or indirectly through sale.
  - **Rivalrous** meaning one's use of the goods (or bad) doesn't affect another's use.
  - **Transferable** meaning that all property rights can be exchanged in voluntary markets.
  - **Excludable** meaning that the owner where possible and practical can reasonably restrict the consumption of the good (or bad) to certain users.
  - **Enforceable** meaning that legal institutions exist to guarantee property rights.
- Property rights facilitate the **efficient allocation** of goods by allowing resource owners to transfer them to other agents who place a higher value on the resource.
  - The **Coase Theorem** states that irrespective of who property rights are awarded to, the optimal market production outcome will be achieved through negotiation where administration costs are negligible.