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BA Economics Honours | Semester V | Calicut University

# Environment and Sustainable Development

Course Code: ECO5EJ302 • Module 3

# Module III: Measuring Environmental Values

Because many environmental goods and ecosystem services are not traded in commercial marketplaces, economists formulate specialized non-market valuation methodologies to estimate their Total Economic Value (TEV).

## Unit 13 & 14: Non-Market Environmental Valuation Techniques

**Total Economic Value (TEV)** is decomposed into:

- *Use Values:* Direct use (timber, fish), indirect use (flood control, watershed protection), and option value (preserving an asset for potential future use).
- *Non-Use Values:* Existence value (satisfaction of knowing a species or ecosystem exists) and bequest value (preserving nature for future generations).

### Valuation methodologies

- **Revealed Preference Methods:**
  - ***Travel Cost Method (TCM):* Estimates the recreational economic value of national parks, lakes, and reserves based on travel expenditures, transit time, and admission costs incurred by visitors.**
  - ***Hedonic Pricing Method:* Infers environmental value (e.g., clean air, scenic vistas) from price differentials in real estate housing markets.**
  - ***Replacement Cost & Preventive Expenditure:* Valuing ecosystem damage based on actual financial costs incurred to replace damaged assets or prevent ecological harm.**
- **Stated Preference Methods: Contingent Valuation Method (CVM): Utilizes structured survey questionnaires to construct hypothetical markets, directly eliciting individuals' Willingness to Pay (WTP) for environmental improvements or Willingness to Accept (WTA) compensation for environmental damages.**
- **Environmental Impact Assessment (EIA): Formal statutory appraisal process evaluating potential environmental consequences of proposed infrastructure and industrial projects before licensing.**

## Unit 15 & 16: Optimal Natural Resource Harvesting and Depletion

- **Renewable Resources (Fisheries & Forests): Maximum Sustainable Yield (MSY):** Biological growth follows a logistic growth curve. MSY represents the largest harvest that can be extracted perpetually without shrinking the underlying biological stock. Economic optimum (Gordon-Schaefer model) occurs where marginal revenue of harvesting effort equals marginal harvesting cost, which lies below biological MSY due to harvesting costs.
- **Non-Renewable Resources: Hotelling's Rule (Harold Hotelling, 1931):** For an exhaustible mineral resource, optimal intertemporal depletion requires the net resource price (price minus marginal extraction cost, or resource rent) to appreciate at a rate equal to the real market rate of interest:

$$\frac{\dot{P} - MC}{P - MC} = r$$

## Advanced Theoretical Formulations and Empirical Frameworks (Analytical Division 1)

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### Empirical Methodology, Identification Strategies, and Econometric Estimation

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Consider the structural estimation of policy impacts across decentralized economic agents. When evaluating macroeconomic interventions or microeconomic regulatory changes, parameters estimated from observational datasets must account for expectations formation and structural parameter stability in accordance with the Lucas Critique. Consequently, contemporary applied economics bridges micro-foundations with aggregate macroeconomic phenomena through dynamic stochastic general equilibrium (DSGE) modeling and micro-econometric panel estimations.

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### Comprehensive Empirical Analysis: The Kerala Model and Sub-National Development

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However, contemporary economic analysis also highlights structural challenges confronting this development paradigm: high educated unemployment, fiscal constraints stemming from escalating public debt servicing and pension obligations, and heavy reliance on external remittance inflows from migrant workers in the Persian Gulf. Sustaining this high-welfare equilibrium necessitates transitioning toward a knowledge-driven economy, incentivizing high-tech manufacturing, and mobilizing sustainable sub-national fiscal resources.

### Policy Synthesis and Analytical Evaluation

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