

# Game Theory 6:

# Global Implications & SDGs



GAME OF GAINS

# International Trade

## Core Concepts of Tit-for-Tat

- **Tit-for-Tat:** A strategy in a repeated game where a player starts with cooperation and thereafter mimics the opponent's previous move.
- **The Reciprocity Principle:** This approach relies on a simple "eye for an eye" logic, rewarding collaborative behavior with cooperation and meeting aggression with immediate retaliation.
- **The Power of Forgiveness:** A vital component of the strategy is its ability to resume cooperation instantly if the opponent stops defecting, preventing endless cycles of conflict.
- **Predictability and Clarity:** Because the rules are transparent, opponents can easily learn that their own actions directly determine the quality of the bilateral relationship.

## SDG 8: Trade Wars and Economic Growth

- **The Cycle of Defection:** Trade wars are modeled as cycles of mutual defection where countries impose protectionist measures, resulting in a lose-lose scenario for the global economy.
- **Reducing Global Efficiency:** When nations abandon cooperative trade, they increase costs for businesses and consumers, directly undermining the goals of SDG 8 (Economic Growth).
- **Incentives for Protectionism:** Despite the long-term damage, individual leaders may face a short-term incentive to defect to protect domestic industries, even if it triggers a global slowdown.
- **Hindering Sustainable Development:** These trade conflicts create market volatility that discourages the long-term investment required to meet the 2030 Agenda targets.

# The Tragedy of the Commons

## Structural Foundations of Shared Resources

- **Tragedy of the Commons:** A situation where individual self-interest leads to the depletion of a shared resource, even when players know that total exhaustion is inevitable.
- **The Collective Action Problem:** Because no single entity owns the resource, individuals feel that if they do not harvest it, someone else will, leading to over-exploitation.
- **Rationality vs. Sustainability:** What is rational for the individual—taking as much as possible—is catastrophic for the group, representing a failure of unregulated markets.
- **The Absence of Property Rights:** Without clear boundaries or rules, the shared "commons" are subject to a race to the bottom where consumption outpaces regeneration.
- **The Perceived Zero-Sum Nature:** Individuals often view shared resources as a "use it or lose it" scenario, where any personal restraint is seen as a gift to a less-scrupulous competitor.
- **Externalities of Depletion:** The negative costs of one person's consumption are "externalized" to the entire community, while the private benefits remain concentrated in the hands of the individual user.
- **The Scaling Effect:** As the number of users increases, the individual sense of responsibility diminishes, making collective governance significantly more difficult to enforce.

## Case Study: Bluefin Tuna (SDG 14)

- **Over-Harvesting Dynamics:** In the global fishing industry, individual fleets maximize their catch to secure immediate profits, ignoring the risk of species collapse.
- **SDG 14 (Life Below Water):** The depletion of Bluefin Tuna populations is a direct threat to marine ecosystems and the sustainable management of oceanic resources.
- **Market Pressures:** The high price of tuna creates a powerful economic incentive to ignore conservation limits, as the immediate payoff outweighs the long-term cost of a dead industry.
- **The Exploitation Tipping Point:** Ecological systems can only withstand a certain level of pressure before they hit a critical threshold and fail to recover.

# Diplomacy & Repeated Games

## The Shadow of the Future

- **Shadow of the Future:** The increased likelihood of cooperation today because players expect to interact again tomorrow and value those future payoffs.
- **The Deterrence Effect:** When interactions are repeated, the threat of future punishment (retaliation) outweighs the short-term gain of cheating on an agreement.
- **Increasing the Stakes:** Players are more likely to stay "honest" if the relationship is perceived as long-lasting, as the long-term benefits of trust exceed a one-time win.
- **The Discount Factor:** For cooperation to thrive, participants must not value current rewards so highly that they ignore the consequences of future interactions.
- **The Value of Iteration:** Repeated games transform a one-time "hit and run" temptation into a long-term partnership where the cumulative value of cooperation dwarfs the one-time gain of betrayal.
- **Enforcing Social Norms:** Frequent interactions allow a community of players to establish and enforce behavioral standards, effectively blacklisting those who demonstrate a pattern of defection.
- **Information Transparency:** In a repeated setting, a player's historical data becomes public knowledge, reducing the uncertainty and information asymmetry that typically plague diplomatic negotiations.

## Iterated Interactions in Global Politics

- **Building Diplomatic Trust:** Repeated diplomatic engagement allows nations to build a reputation for reliability, which serves as a foundation for more complex treaties.
- **Strategic Patience:** The "Shadow" encourages nations to look past immediate grievances in favor of maintaining regional stability and ongoing economic partnerships.
- **End-Game Vulnerability:** If the "Shadow of the Future" is removed—such as when a leader is leaving office or a treaty is expiring—the incentive to defect increases significantly.

# The 2030 Agenda

## Core Characteristics of a Public Good

- **Public Good:** A service (like clean air or global health) that is non-excludable and non-rivalrous, meaning it is available to everyone and one person's use does not limit another's.
- **The Non-Excludability Challenge:** Because it is impossible to prevent "free-riders" from using the good, there is little private incentive to fund or maintain it.
- **Non-Rivalry in Consumption:** The benefit of a public good does not diminish as more people use it, making it a universal asset for collective survival.
- **Market Failure:** Without government or international intervention, public goods like climate stability are consistently under-produced and over-polluted by private actors.
- **The Global Under-Provision Risk:** Because no single nation captures the full benefit of investing in a global public good, there is a systemic tendency to wait for others to bear the financial burden.
- **Sovereignty vs. Stewardship:** The lack of a central global authority makes the management of public goods a voluntary effort, often leading to gaps in protection during times of geopolitical tension.
- **Cross-Border Externalities:** The degradation of a public good in one region (such as a pandemic outbreak) quickly spills over into others, highlighting the interconnected nature of modern survival.

## Summary: The SDGs as a Coordination Game

- **Global Rules and Incentives:** Achieving the SDGs is a massive Coordination Game that requires changing global rules to align individual national incentives with collective survival.
- **Aligning the Matrix:** The 2030 Agenda serves as a framework to shift the global payoff matrix from competitive defection to a stable, cooperative equilibrium.
- **Collective Survival:** Success depends on the recognition that the "sucker's payoff" of acting alone is less dangerous than the mutual destruction caused by failing to coordinate on climate and health.