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# Trade-offs in Environment and Trade : Need for sustainable development

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## Introduction

In economics the term 'trade-off' is expressed as opportunity cost, referring to the most preferred alternative given up. A trade-off, then, involves a sacrifice that must be made to obtain a certain product, rather than other products that can be made using the same required resources. For a person going to a basketball game, its opportunity cost is the money and time expended, say that would have been spent watching a particular television program (Wikipedia). Another key word is 'sustainable development'. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development). Sustainable development was added as one of the general objectives of the World Trade Organization when it was established in 1994.

In this write-up, an introduction is given about the ecosystem and the significance of the services it provides followed by an introduction to the factors which affect sustainability. Also a few instances where the marine resources have been affected and disputes in international level which the World Trade Organization had to solve.

## How the WTO facilitates protection of the environment

There are several provisions in the WTO agreements dealing with environment. There is a reference to sustainable development as one of the general objectives to be served by the WTO in the Marrakech Agreement which established the WTO. There are provisions in the Agreement on Agriculture and the General Agreement on Trade in Services (GATS). However by far and away the most important provisions as far as environmental issues are concerned are Article XX of the GATT and the Agreements on Sanitary and Phytosanitary Measures and the Agreement on Technical Barriers to Trade (Oxlay; *www.apec.org.au/docs/oxley2001.pdf* www.apec.org.au/docs/**oxley**2001.pdf)

## Why environment is important: the ecosystem services

Ecosystem services, ecological footprints and and other information have been sourced from the report of WWF entitled 'Focusing on the future' (WWF-2012; The Living Planet Report 2010)[1] . The Living Planet Report relates the Living Planet Index – a measure of the

health of the world's biodiversity – to the Ecological Footprint and the Water Footprint – measures of humanity's demands on the Earth's natural resources. Ecosystem services are the benefits that people obtain from ecosystems (Millennium Ecosystem Assessment, 2005).They can be mainly be categorized as given under

1. **Provisioning services: goods obtained directly from** ecosystems (e.g. fish, food, medicine, timber, fibre, biofuel)

2. **Regulating services: benefits obtained from the** regulation of natural processes (e.g. water filtration, waste decomposition, climate regulation, crop pollination)

3. **Supporting services: regulation of basic ecological** functions and processes that are necessary for the provision of all other ecosystem services (e.g. nutrient cycling, photosynthesis, soil formation)

4. **Cultural services: psychological and emotional benefits** gained from human relations with ecosystems (e.g. enriching recreational, aesthetic and spiritual experiences

**Threats to Environment due to development/trade related reasons**

All human activities make use of ecosystem services, but can also put pressure on the biodiversity that supports these services. The five greatest direct pressures as indicated in the Living Planet Report 2011 are:

**Habitat loss, alteration, and fragmentation**: mainly through conversion of land for agricultural, aquaculture, industrial or urban use; damming and other changes to river systems for irrigation, hydropower or flow regulation; and damaging fishing activities (WWF-2012). Several studies have shown the drastic decline in nearshore critical habitats like mangroves and seagrass due to anthropogenic activities. These point to the fact that the breeding and nursery grounds of several important commercial fishes and shellfishes like the penaied and non penaeid resources are lost. This will create repercussions on the fishery due to low recruitment leading to poor catches, low income and trade opportunities', less food. This will also lead to social problems like alternate livelihood opportunities for fisher families and migration of fishers.

**Over-exploitation of wild species populations**: harvesting of animals and plants for food, materials or medicine at a rate above the reproductive capacity of the population (WWF-2012). One typical example of the overexploitation is the cod fishery. The Newfoundland cod fishery was closed in the early 1990s because stocks had declined drastically and thousands of fishers lost their jobs and the financial cost was estimated as at least US$2 billion .
Rapid declines in Atlantic cod (*Gadus morhua*) fisheries are well documented . As a commodity in world trade, this species has been heavily exploited for several centuries The Living Planet Index (WWF-2012) for Atlantic cod suggests that populations have declined by an average of 74 per cent over the past 50 years. Losses have been greatest in the Northwest Atlantic. The biomass of the Scotian Shelf stock is less than 3 percent of the pre-industrial fishing level.

**Pollution**: The main pollution is from excessive pesticide use in agriculture and aquaculture; urban and industrial effluents; mining waste; and excessive fertilizer use in agriculture (WWF-2012). In recent years, marine litter is contributing to pollution. This has lead to concept such as "ghost fishing" due to derelict fishing gear. Marine litter has started impacting the habitats where fishes spawn. Apart from the seafood industry it will also have impacts on the tourism industry.

**Climate change**: due to rising levels of greenhouse gases in the atmosphere, caused mainly by the burning of fossil fuels, forest clearing and industrial processes (WWF-2012).
**Invasive species**: introduced deliberately or inadvertently to one part of the world from another; they then become competitors, predators or parasites of native species (WWF-2012).

**The Living Planet Index (LPI)**

The Living Planet Index (LPI) reflects changes in the health of the planet's ecosystems by tracking trends in nearly 8,000 populations of vertebrate species. The global Living Planet Index declined by almost 30 per cent between 1970 and 2008. The global tropical index declined by 60 per cent during the same period.The global temperate index increased by 31 per cent; however this disguises huge historical losses prior to 1970.
The marine Living Planet Index declined by more than 20 per cent between 1970 and 2008 (WWF-2012). The marine index includes 2,395 populations of 675 species of fish, seabirds, marine turtles and marine mammals found in temperate and tropical marine pelagic, coastal and reef ecosystems. Approximately half of the species in this index are commercially used.
Marine ecosystems exhibit the largest discrepancy between tropical and temperate species: the tropical marine index shows a decline of around 60 per cent between 1970 and 2008, while the temperate marine index increased by around 50 per cent. There is evidence that temperate marine and coastal species experienced massive long-term declines over the past few centuries (Lotze et al., 2006; Thurstan et al., 2010); therefore the temperate marine index started from a much lower baseline in 1970 than the tropical marine index. The relative increase in temperate marine populations since then is likely a reflection of slight recovery from historic lows

**Measuring the human demand: Ecological Footprint**

The 'Ecological Footprint' is an accounting framework that tracks humanity's competing demands on the biosphere by comparing human demand against the regenerative capacity of the planet (WWF-2012).
To determine whether human demand for renewable resources and CO2 uptake can be maintained, the Ecological Footprint is compared to the regenerative capacity (or 'biocapacity') of the planet. 'Bio-capacity' is the total regenerative capacity available to serve the demand represented by the Footprint. Both the Ecological Footprint (which represents demand for resources) and biocapacity (which represents the availability of resources) are expressed in units called global hectares (gha), with 1gha representing the productive capacity of 1ha of land at world average productivity (WWF-2012). When trade progresses the bio-capacity of the marine ecosystem should be considered and the ecological foot print should not be damanging.

**Human demands on the planet exceed supply**
**(**Abstract from The Living Planet Report 2012)

- Humanity's Ecological Footprint exceeded the Earth's biocapacity by more than 50 % in 2008.
- In recent decades, the carbon footprint is a significant component of this ecological overshoot.
- Biocapacity per person decreased from 3.2 global hectares (gha) in 1961 to 1.8 gha per capita in 2008, even though total global biocapacity increased over this time.
- Rising consumption trends in high-income groups around the world and in BRIICS countries, combined with growing population numbers, provide warning signs of the potential for even larger footprints in the future**.**

**Focus on our footprint: Marine fisheries**

Currently the most widely used indicator for development is the United Nations Development Programme's (UNDP) Human Development Index (HDI) which, by combining income, life expectancy and educational attainment, compares countries based on both their economic and social development level. The UN defines the threshold for a high level of development as an HDI value of 0.8. Countries meeting or exceeding this threshold show an enormous range in per person Ecological Footprint, from Peru with a Footprint of just over 1.5gha to Luxembourg with a Footprint of over 9gha per person.

Fishes are vital to billions of people around the world Wild fish form a central food source for billions of people — and are increasingly used as feed for poultry, livestock and farmed fish. The habitats that support commercial marine fish populations are also important, providing coastal protection from storms and other large waves, supporting marine-based tourism, and shaping the cultural identity of coastal societies around the world (WWF-2012).

**Overfishing is the greatest threat to fish stocks and marine biodiversity**

High demand for fish and fish products combined with overcapacity in the global fishing fleet and inefficient fishing techniques have driven massive overfishing. This is often encouraged by subsidies, which support fishing activity even for depleted stocks that would otherwise be unprofitable (WWF-2012).

Seventy per cent of commercial marine fish stocks are now threatened, with some fisheries and stocks, such as Mediterranean bluefin tuna, already on the verge of collapse. As large, long-lived predators like cod and tuna have become depleted; fishing fleets have increasingly turned to small, short-lived species further down the food chain, like sardines, squid, shrimp and even krill — threatening the balance of entire marine ecosystems. This has led to 'Fishing down the food web'. This will lead to changed trading pattern and new value chains. In the long run, sustainability will be affected and this can also lead to conditions like "Starved Marine System". A typical example is the cod fishery which collapsed in 1992 and did not recover even after one decade. In this ecosystem, they have observed the starved condition, where fishes with large head and thin body. Damaging fishing practices and a high level of incidental catch of non-target species (bycatch) further threaten marine habitats and species around the globe (WWF-2012).

Another ecological phenomenon is the cascading effect seen in many ecosystems. When there a sharp decline in big sharks along the Eastern Seaboard this led to a boom in other marine species which affected valuable commercial fisheries. The study by a team of Canadian and U.S. scientists found that intense fishing for sharks in the northwest Atlantic over the past 35 years has produced a cascade of unexpected effects. With fewer large predators in the sea, the number of rays, skates and small shark species has exploded, and these species are decimating such shellfish populations as North Carolina bay scallops and the Chesapeake Bay's American oysters.

Catch rates of some species of large predatory fishes – such as marlin, tuna and billfish – have dramatically declined over the last 50 years, particularly in coastal areas of the North Atlantic and the North Pacific (WWF-2012). This continuing trend also applies to sharks and other marine species. Targeted fishing of top predators has changed whole ecological communities, with increasing abundance of smaller marine animals at lower trophic levels as a consequence of the larger species being removed. This in turn has an

impact on the growth of algae and coral health (WWF-2012). Such changes in the ecosystem will affect on other fish stocks and the trade and livelihood related to fisheries and tourism.

In India, the recent menace of puffer fish along Kerala coast can be a boom related to the absence of predators of this fish. Studies on the food of several fishes have indicated that this fish is mainly predated upon by the Cobia and the recent increased harvests of cobia would have led to decline in predator population which would have supported the population increase of puffers. Since puffers are do not have many predators unlike other fishes of tropical ecosystem, the declining predator pressure would have led to puffer fish menace in Kerala. (Mohamed et al MS under publication)

**Bad governance**

One major problem behind overfishing is poor fisheries management. Governance issues include systematic failures by many fisheries bodies to heed scientific advice on fish quotas, few international regulations for fishing on the high seas, and the failure of many countries to ratify, implement and/or enforce existing national and international regulations.

The case of shark fishing to meet the demand in international trade for their fins, meat, liver oil, cartilage and hides, and as aquarium specimens is an example of market demand can create ecological imbalances. An estimated 3 million sharks are harvested annually and even when sharks are caught as part of fishing activities for other species such as tuna (as often happens), they are usually retained rather than being discarded. Most shark species are inherently vulnerable to overexploitation since they mature late and have a relatively low reproductive output compared to other fish species.

**'Business as usual'**

The "business as usual" scenario predicts that humanity will be using resources and land at the rate of 2 planets each year by 2030,and just over 2.8 planets each year by 2050 (WWF-2010). As the "business as usual" scenario shows, our present track is unsustainable.

**WTO and disputes on ecosystem related aspects**

Turtle x Shrimp Issue : The United States had implemented a ban on shrimp from countries whose fishing fleets did not have special "turtle excluder devices(TED)," to prevent endangered sea turtles from being killed in the shrimp fishing process. India, Malaysia, Thailand, and Pakistan claimed that the law was a disguised restriction on free trade and challenged the measure in the WTO an international body dealing with the rules of trade between participating nation's dispute resolution process. The dispute was settled and trade continued.

Tuna x Dolphin Issue : In eastern tropical areas of the Pacific Ocean, schools of yellowfin tuna often swim beneath schools of dolphins. When tuna is harvested with purse seine nets, dolphins are trapped in the nets. They often die unless they are released. The US imposed a ban on imports of tuna fished from such areas.

This case still attracts a lot of attention because of its implications for environmental disputes. The case was by Mexico and others against the US under GATT. The panel report was circulated in 1991, but not adopted, so it does not have the status of a legal interpretation of GATT law. The US and Mexico settled "out of court".It was handled under the old GATT dispute settlement procedure. Key questions are:

- Can one country tell another what its environmental regulations should be?
- Do trade rules permit action to be taken against the method used to produce goods (rather than the quality of the goods themselves)?

A complaint about the WTO provisions is that trade restrictions on how a product is produced or processed are not permitted. Challenges under GATT and WTO provisions that US restrictions on imports of tuna in cases where fishing methods did not minimize the incidental kill of dolphin were lost. The general point was that the WTO did not permit one member to restrict trade with another on the basis that they did not apply policies which the first party preferred (Oxlay) .

The environmental case is that if one method of processing (such as a method of fishing for tuna) causes environmental damage (high levels of incidental kill of dolphin) then an importer should be able to express preference for the product (tuna) processed in a way that does not cause environmental damage (caught using fishing methods that reduced the incidental kill of dolphin). WTO provisions generally do not allow trade to be restricted on those grounds. The
TBT Agreement recognizes "related processing technology" as a relevant consideration for applying a mandatory technical standard to protect the environment (The green peace report; www. greenpeace.org).

**Other farmed seafood trade** : The issues related to farmed catfish from Vietnam (anti-dumping), rejection of shrimp from India by Japan in September 2012 are some issues related to trade and production.

**Better management practices**

Sustainable fisheries management can help to restore and maintain both fisheries' productivity and marine biodiversity. This would also increase the resistance of fisheries and marine ecosystems to other pressures like pollution, increased ocean acidification and climate change, as well as safeguard food supplies for coastal communities. In order to maintain, and even increase fish catches in the long term, fisheries' biocapacity needs to be increased. At the fisheries management level, this means maintaining fish stocks at optimal population and age levels to maximize growth, while at the ecosystem level it means improving and conserving marine habitats by establishing protected areas, limiting coastal pollution and curbing carbon dioxide emissions (WWF 2010).

**Ecosystem Based Fisheries Management (EBFM)**

The EBFM can help inn sustaining fisheries. A typical example of EBFM is the pollock fishery in the North Pacific under USA jurisdiction. Here Total Allowable Catch (TAC) set in accordance with the precautionary approach and Individual harvesting quotas allocated to each fishing vessel. Apart from this harvests are monitored closely by independent observers and by-catch is extremely low. In India, the clam fishery of Ashtamudi Lake is managed by observing a ban during the spawning period of clams which was identified by scientists of CMFRI. Every year fishermen abstain from fishing from November to February and the fishery is sustained.
In India, the CMFRI has developed detailed trophic models from primary data sources for Arabian Sea off Karnataka, Northwest Coast Ecosystem (NWC) and Gulf of Mannar (GOM).

**A green economy ?**

The last two years have seen the rise of discussions at an international level on the need to build a global "green economy". In a green economy, economic thinking embraces people and the planet. According to UNEF a green economy is described as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In other words, we can think of a green economy as an economic environment that achieves low carbon emissions, resource efficiency and at the same time is socially inclusive. For promoting sustained trade it is imperative that we reduce over fishing, promote trade of eco-labeled products and comply with environment and resource protection regulations. We cannot afford to sacrifice environment at the cost of trade nor can we deny development of trade.

*The teaching material has been mainly sourced from the 'The Living Planet Report 2012' published by WWF. More detailed information on the work related to CMFRI is available at CMFRI website (eprints)*

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