

BLUE TECHNOLOGY TOWARDS SUSTAINABLE URBAN AND COASTAL DEVELOPMENT

Nicholas Kathijotes

Abstract. The aim of Blue Economy models are to shift society from scarcity to abundance –based on what we have, and to start tackling issues that cause environmental and related problems through new and novel ways. Some major factors that cause ecological alterations to coastal and surface waters and contribute to nutrient inputs include, in no special order, municipal wastewater and storm water discharges; combined sewer overflows; other urban runoff; agricultural runoff; aquacultures, and various others. The issue of nutrient input due to aquaculture, being a serious input source in developing countries is emphasized together with actual measurements and control techniques applied in EU. Other key issues in coastal and aquaculture environments including Coastal Tourism, Marine Renewable Energy, Blue Biotechnology and Spatial Planning are presented within the scope of blue economy principle and thus suggesting novel actual management techniques.

Keywords: Blue economy, nutrients, fisheries, sustainability, tourism, biotechnology.

1. INTRODUCTION

The world's oceans and coasts – the *Blue World* – are the *cornucopia for humanity*. They provide us with food, oxygen and livelihoods. The Earth is a blue planet, with 71 per cent of its 510 million km² surface covered by marine waters whose average depth is four times the average elevation of the land. This makes the marine biosphere the largest ecosystem on Earth, though with remarkably diverse abundance of life, from being virtually barren to productivity hot-spots.

"Environmental deterioration and the imbalance between man and nature increasingly preoccupy scholars, philosophers, businessmen and policy makers alike. The disparity between rich and poor and the continuous incapacity to respond to the basic needs of all (not only humans) preoccupies many. It seems that the only sustainable phenomena of our modern time are the loss of biodiversity and our incapacity to eliminate poverty. Even though we all look reality in the eye, we seem to lack the vision and the tools to make a difference and steer our excessive consumption society in general and our competitive business world towards sustainability.

The Green Economy project launched 30 years ago, but it still depends on public subsidies and grants. If a green product costs twice or three times as much as a regular product it becomes a luxury commodity that ordinary people cannot afford. Why would anyone want to invest in such a project?

In conceptualizing 'Blue Economy', we can say that 'Blue economy' refers to the new system of ocean-based Green Economy that interweaves creative neo-science and technologies with the ocean.

More precisely, it implies a new growth engine by promoting both the sustainable use and preservation of the oceans, ensuring the Earth's continued survival.

'Blue Economy' also describes the desirable future of the human society

I suggest then that introducing more innovative technologies to the market based on The Blue Economy Concept. These innovative technologies will generate new cash flow, which will create jobs and build social capital. The top priority in this process is to develop entrepreneurship and to find more people who are willing to take risks. Also it is important to find investors who believe that these are good opportunities. "The Blue Economy" is a social system created by through a step by step process. It is named after this beautiful mother Earth whose sky and ocean are blue, as long as there is no pollution. Therefore I suggest calling the social system "The Blue Economy" created through a truly sustainable process.

Apply mitigation and adaptation measures for global climate change, tsunamis, storms and other natural hazards. Ensure that all people are able to meet their basic **human needs**; i.e. food, clothing, housing, health, education and transportation. Increase **access of local communities to technology**, infrastructure, capital, markets, information and other productive economic assets.

2. LITERATURE REVIEW AND DISCUSSION

"Living with the ocean and from the ocean and in a sustainable relationship" (A. Behnam, 2012). The concept of "Blue Economy for Sustainable Coastal Development" is an introduction of more innovative technologies to the market based on this concept.

These innovative technologies are expected to generate new cash flow, and consequently new jobs. It is important to find investors who believe that these are good opportunities. "The Blue Economy" is a

social system created by through a step by step process. It is named after this beautiful Earth whose sky and ocean are blue, as long as there is no pollution.

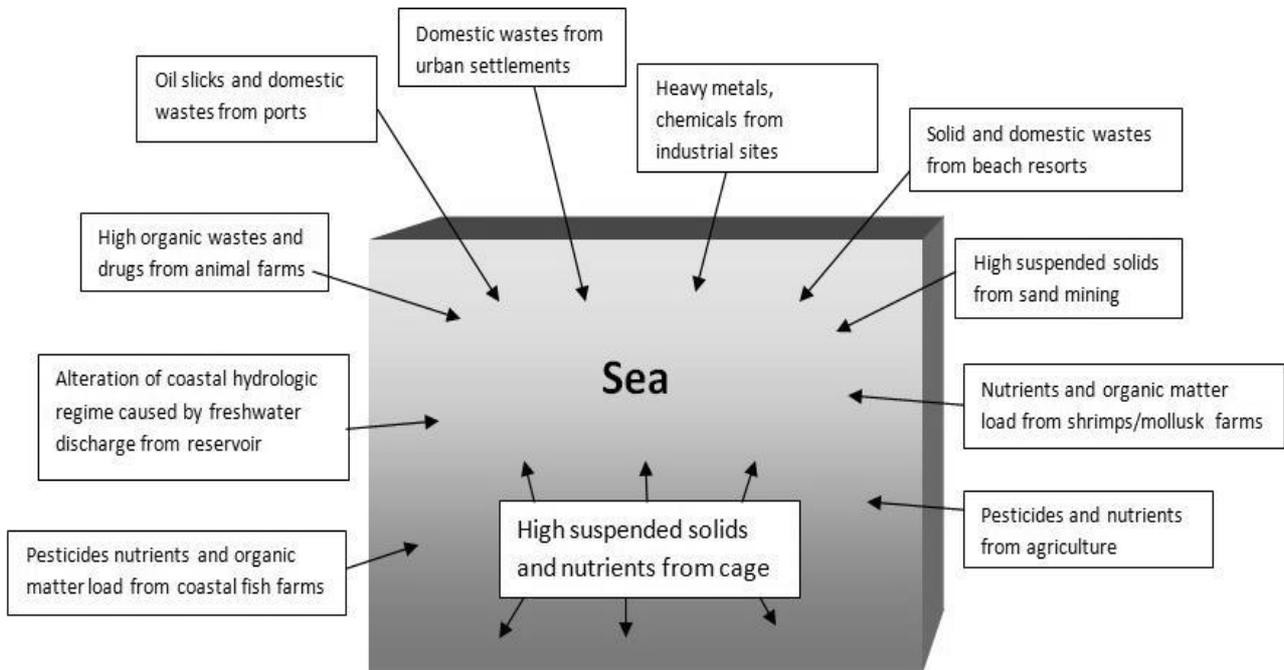


Fig. 1. Pollution Sources in Aquaculture Raising Environments

Pollution can be controlled by applying **zero-waste technology**, "3 R" (Reduce, Reuse and Recycle) technology, together with wastewater treatment facilities. Every economic sector as well as human activity must produce low or no carbon emissions and waste. It is necessary then to improve the productivity and efficiency of economic sectors on a sustainable basis. Blue economy as the mainstream of national development and can integrate socio-economic development based on land and sea in a sustainable manner. Firstly, we have to establish an integrated spatial planning for upland-coastal-ocean areas of any given region. There are public processes of analysing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process. Spatial planning (Zoning) is also required in order to attract investors.

2.1 Nutrient Pollution-Fisheries and Aquaculture

Ocean Nutrient pollution is mainly due to, wastewater treatment plants, agricultural runoff, urban runoff, groundwater seepage and atmospheric

deposition release of previously accumulated nutrients from sediments.

Fish accounts for about 15.7% of the animal protein consumed globally. The UN Food and Agriculture Organisation estimates that aquaculture provides half of this, and that by 2030 it will reach 65%. It is currently 25% in the EU. They also contribute largely to ocean nutrient loads, fig 3. On an overall basis large amounts of nutrients added as fish feed are dissolved into the oceans, Fig.4.

Globally, it has a growth rate of 6.6% per annum, making it the fastest-growing animal-food-producing sector and faster than the 1.8% annual global population increases. It is thus contributing to an overall improvement in human diet. Growth in the aquaculture sector in Asia, which accounts for more than 89% of global production, is more than 5% a year, while EU growth in the sector is stagnant.

Fishers and fish-farmers should, given the dependence of their businesses and livelihoods on ecosystem services, be stewards of the marine environment. Greening the fisheries and aquaculture sectors requires the overall recognition of their wider societal roles.



Fig. 2. Marine spatial planning (Ehler & Douvère, 2006)

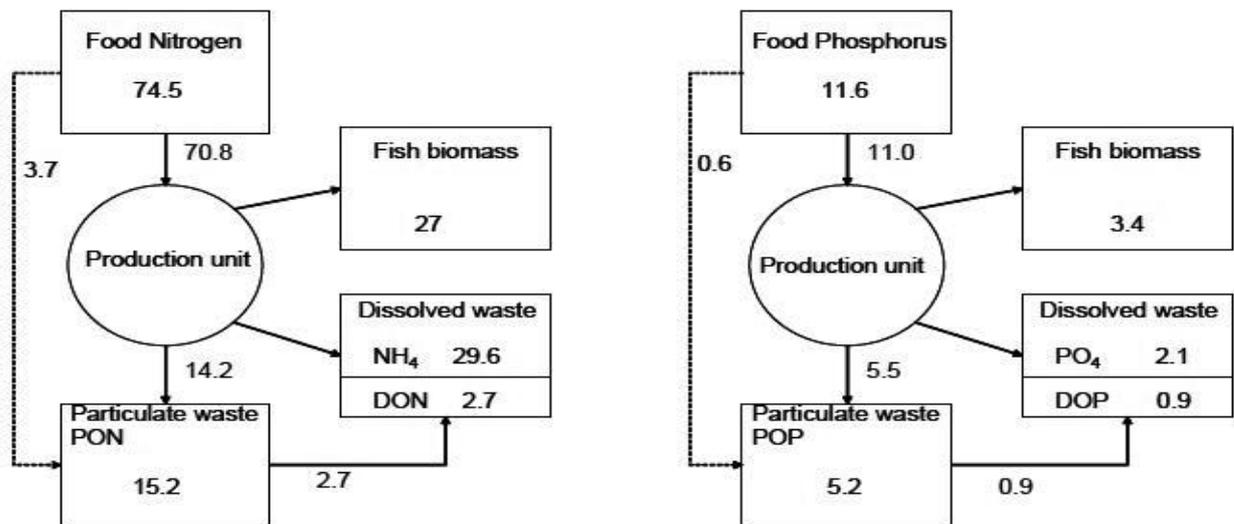


Fig.3. Annual Nutrient Loading Based on a hypothetical cage producing 1000 metric tons wet weight of fish/year (Olsen et.al.2008).

Investment to reduce fossil energy use and thus the carbon footprint of fisheries and aquaculture has potential gains in terms of improved economic performance and in contributing to mitigating climate change.

The reduction of fishing effort and the use of non-destructive fishing techniques will reduce the negative impacts on biodiversity. Strengthening regional fisheries bodies, national fisheries management

agencies, fishing community and fish workers organisations and private sector associations is critical to sustainable and equitable use of marine resources.

On the policy level, and in applying Integrated Coastal Area Management-Focussing on Aquaculture and in order to minimize adverse effects of coastal aquaculture on the environment and vice versa, promoting sustainable development, it needs:

- Intervention at local and national levels

-Considerations of interactions between social, economic and environmental factors within the framework of Integrated Coastal Area Management

-Production of sustained social benefits through ICAM and pointing out the responsibility to the aquaculture industry.

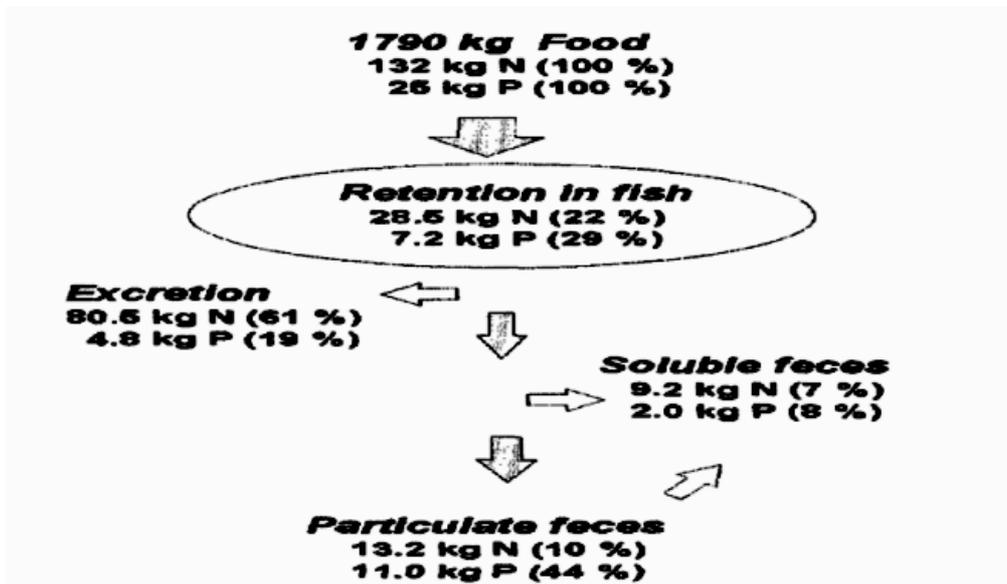


Fig. 4. Nutrient budget for Mediterranean sea bream culture in kg/ton of fish produced up to 400g size (Lupatsch 1998).

The utilization rate of renewable resources, such as fish stocks, mangroves and other living resources should not exceed their renewable capacity.

2.2 Maritime Transport

Shipping needs a global regulatory framework in which to operate: as an inherently international industry it requires the same rules to apply at both ends of a voyage. Shipping is the safest, most secure, most efficient and most environmentally sound means of bulk transportation. Shipping is subject to the first ever global and legally binding CO2 regulations for an entire economic or industrial sector.

International shipping contributes to the main pillars of sustainable development. Further greening of the sector is nevertheless desirable and achievable.

2.3 Coastal Tourism

Globally, coastal tourism is the largest market segment and is growing rapidly, becoming less sustainable. Marine and coastal environments are threatened assets of global tourism. Climate change is demanding a greening of marine and coastal tourism. By creating sustainable tourism we can create new jobs and reduce poverty. Tourism development can support local economy and again reduce poverty.

Investing in greening tourism can reduce costs and enhance the value of ecosystems and cultural heritage. The private sector must be mobilized to support sustainable tourism and needs access to financing for investing in greening practices.

Cross-sectorial consultation and Integrated Coastal Zone Management (ICZM) are required for good sustainable tourism, destination planning and development strategies.

Government investments and policies can leverage private sector actions on sustainable tourism. Design and construction works in coastal and ocean areas should be in harmony with the structure, characteristics and dynamic of any given unit of a coastal and ocean zone.

2.4 Marine-Based Blue Energy

It is a priority to reduce the use of fossil fuels and simultaneously use renewable energy including solar energy, wind power, wave energy, tidal energy, Ocean Thermal Energy Conversion (OTEC) and biofuel from marine algae and sea grasses. Marine energies have the potential to enhance the efficiency of harvesting the energy resource, minimize land-use requirements of the power sector and reduce the greenhouse gas emissions. These include: Wind-driven marine waves; Gravitation induced marine tidal (tidal-range barrage); Tidal stream (marine currents);

Marine salinity gradients; and Thermal gradients between warm surface water and deep (> 1000 m) cold water (also called ocean thermal energy conversion, OTEC). Extreme care should be given to the prevention or interference with natural processes.

2.5 Marine Mineral Resources

Between 2000 and 2010 there has been an annual increase of about 15% in the price of many non-energy raw materials, mainly as a result of consumer demand in emerging economies

Advances in technology as well as concerns over security of supply have encouraged mining companies to consider what the sea can provide. The exploitation and mining of minerals, other than sand and gravel, from the sea have just started. By 2020, 5% of the world's minerals, including cobalt, copper and zinc could come from the ocean floors. This could rise to 10% by 2030.

It may also become economically feasible to extract dissolved minerals, such as boron or lithium, from seawater. The most promising deposits are found in metallic sulphides which emerge from hydrothermal ore deposits (such as 'black smokers') in volcanically active zones.

Deep-sea minerals, as any other mineral resources, are not endless.

All stakeholders need to be considered when managing deep-sea mining activities in the context of the sustainable use of the oceans.

Any exploitation of non-renewable resources including oil and gas, and other mining and mineral resources must be carried out in an environmentally friendly manner, and their economic returns should be used to improve the capacity and well-being of coastal communities, to develop substitute materials and to develop sustainable economic activities. It is essential to conserve **biodiversity at genetic, species, and ecosystem levels.**

2.6 Blue Biotechnology

The unexplored and understudied nature of much of the underwater world means that the capacity of marine organisms other than fish and shellfish to provide inputs to the blue economy is only just beginning to be appreciated, partly through new gene sequencing technologies for living organisms.

The anti-viral drugs were obtained from nucleosides isolated from Caribbean sponges. Other companies developed from small soft-bodied marine

animals the first drug of marine origin to fight cancer.

Exploration of the sea biodiversity is now helping us understand for example how organisms that can withstand extremes of temperature and pressure and grow without light could be used to develop new industrial enzymes or pharmaceuticals.

At the same time, concerns about the land-use impact and the thirst for water of terrestrial crops grown for biofuel are driving efforts to explore the use of algae as a source of biofuels, along with high added-value chemicals and bioactive compounds.

3. CONCLUSION

Management decisions and investments that focus on the well-being of the oceans are essential if we are to continue to profit from this rich natural resource. Many natural resources found in marine environments are being degraded by unsustainable use, ultimately putting their ecosystems, food security and climate regulations at severe risk.

The application of a 'blue' economy concept would be a big step on the right path. 'Innovation', is the key word on which to work on.

The world's marine ecosystems provide essential food and livelihoods to millions of people. According to UNEP, a switch to a blue economy would unlock the potential of the marine-based economy while reducing ocean degradation and alleviating poverty.

***Благодарности:** Авторът изказва благодарност на фонд „Научни изследвания” към МОИМ за финансовата подкрепа, получена по проект № ДФНИ-Е01/3 от 27.11-2012г*

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СИНИТЕ ТЕХНОЛОГИИ ЗА УСТОЙЧИВИ ГРАДСКИ И КРАЙБРЕЖНИ РАЙОНИ

Николас Катиджотес

Резюме. Целта на „Сините“ модели в икономиката е да се оцени и информира обществото за наличието на изобилие, въз основа на това, което имаме и да започнат да се разглеждат въпросите, които причиняват проблеми на околната среда чрез нови и нови начини. Представени са някои от основните фактори, които причиняват екологични промени в крайбрежните и повърхностните води и допринасят за освобождаване на биогенни елементи - комунални отпадъчни води и зауствания на дъждовни води; комбинирани канализационни преливници; други градски отпадъци; селскостопанските отпадъци; аквакултури и други.

Въпросът за въвеждане на хранителни вещества е сериозен източник и входен сигнал в развиващите се страни, свързано с действителните измервания и техники за контрол, прилагани в ЕС. Други ключови въпроси в крайбрежните системи, включително и крайбрежния туризъм, морските възобновяеми енергийни източници, сините биотехнологии и устройства на територията са представени в обхвата на синята икономика, която предполага нови реални техники за управление.

Ключови думи: Синя икономика, хранителни вещества, област на рибарството, устойчивост, туризъм, биотехнологии.

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