

# Workgroup D

## Artificial Green Floating Islands

### ABSTRACT

The project aims at reducing the gap between the Eastern and Western part of the Danube River, regarding economic disparities and environmental problems. This gap can be reduced by introducing Artificial Green Floating Islands in the Danube region, with the following objectives: improvement of water quality using specific plants that purify the water to be used in agriculture, attraction of tourists to the less developed countries to make a profit, opening of new jobs for young and inexperienced people, creation for the local people of public places where they can get together and socialize. The introduction of the Artificial Green Floating Islands would also change how people and countries of the area perceive the Danube River turning it from a natural border into a centre for social interaction between different coastal states.

### KEYWORDS

Artificial Green Floating Islands  
economic disparities  
environmental problems  
natural border  
social interaction

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## INTRODUCTION

Danube Region has one of the most diverse population structures in Europe. It comprises 19 countries and approximately 81 million people. The Danube River passes through different countries that have different levels of economic development. From its western to the eastern side, countries in the Danube River basin have different economic and wealth standard. For a half century, countries in the Danube region were divided into Eastern and Western blocs adopting different ways of economic, social and political development. These differences had also some consequences mostly related with the pollution of Danube River. During the Cold War period environmental problems did not attract much attention due to the lack of communication between coastal states in the Danube River.

However, with the fall of communism in 1990's Eastern European countries embarked on a process of European integration. The European Integration made it necessary the invention of a new strategy for the Danube Region in order to bridge the gap between countries in the East and West. Nevertheless, after twenty years of transition social, political and economic disparities are still existent in the daily life of people in the region. The level of wealth in the Western part of the Danube River basin is relatively higher than the Eastern part, which is also the reason of social disparities. Considering current economic conditions in Europe and the financial/economic crisis, it is possible to evaluate this economic difference as an opportunity for the countries in the Danube Region. Giving priority to the less developed countries would increase the attractiveness of the markets as well and contribute into the economic development in the region.

Probably the best interdisciplinary approach to analyzing the relationships between humans and their environment is human ecology. Through the concepts of human ecology we could analyze human adaptations to environment and environmental change, the role of social, cultural and other factors which play the role in maintenance or disruption of ecosystems, relations between technological and environmental changes etc. The analysis of Danube region cannot be complete without taking into consideration the concepts of bioregions and ecoregions. Bioregion is political, cultural and ecological system and they are defined through physical and environmental features, including water, soil and terrain characteristics. So, bioregionalism wants to accent the bioregion as a cultural phenomenon, and emphasizes local populations, knowledge, and solutions. All those aspects must be taken into consideration when we consider the Danube river basin, because it goes well beyond

national boundaries. Ecoregions are smaller than a bioregion and larger than ecosystem, so they cover the areas of land and water and contain characteristic, geographically distinct natural communities and species.

#### Challenges in the Region

Sustainable development encompasses four domains of economic, ecological, political and cultural sustainability. That means that for humans sustainability represents the potential for long-term maintenance of well being and needs to take into consideration all four dimensions which require interdisciplinary approach.

According to some surveys that try to measure the quality of life European cities have high quality of living as a result of a combination of increased stability, rising living standards and advanced city infrastructures. Of course, in some parts of Europe there are constant economic turmoil, political tensions and high unemployment, but among the top ten cities which have the highest quality of living index seven are from Europe. And it is also interesting that Vienna, the Danube city, is on top of the list for four years in a row.

Apart from the economic disparities, the main challenge in the region is the level of the pollution in the Eastern part of the Danube River. Due to the Communist style of industrialization, environmental problems have been mostly ignored for long period. With the fall of the East's communist regimes that scientists and government officials began to realize the seriousness of the environmental havoc which the destructive industrial policies of the former communist regimes had wrought on the Danube watershed. Industrial pollution is especially high on the Danube because the former communist masters in Eastern and Central Europe sought lucrative short-term production goals, often at the price of environmental degradation.

The international nature of the Danube river basin does not allow purely national context of bilateral relations. The implementation of the project might be hampered due to the problems stemming from the priorities set by different countries. Therefore, central communication headquarter has to be created in order to ensure the sustainability of the implementation.

Danube River has long been perceived as a natural border dividing countries like in the case of Bulgaria and Romania. This project aims to change the perception of the division line by turning the Danube River into a centre for social interaction between different coastal states.

The ongoing perspective for the European integration in the region has to be ensured by supporting the political and moral bids for EU membership. The EU is playing a crucial role for the standardization of the bureaucratic and political system, which is the basis for the initiation and the implementation of the project in the region. Therefore, political stability in the Danube Region has

to be fully ensured in a way to address the commitment of all coastal states in the project.

## PROJECT DESCRIPTION

In order to build inclusive, innovative and secure societies, Europe requires a response which demands developing of new knowledge, technologies and capabilities as well as the identification of policy options (Horizon 2020: 22). Supporting that idea and contributing to the development of the region, a project of constructing artificial green floating island could decrease the gap between more developed and less developed countries in the Danube region.

During the last years, floating islands became common natural phenomena that can be found in many parts of the world – mainly on marshlands, lakes, and similar wetland locations and can be many hectares in size [Wikipedia, [http://en.wikipedia.org/wiki/Floating\\_island](http://en.wikipedia.org/wiki/Floating_island)]. With added aeration they are very effective at removing pollutants such as nitrates and ammonia, and increasing the dissolved oxygen in the water.

The surface area of the floating island naturally attracts microbes which cleanse the water and turn unwanted nutrients into fish food. This makes them a natural choice for cleaning not only lakes and streams, but also for wastewater lagoons, farm effluent ponds, and any other waterway impacted by sewage or landfill effluent: winery ponds, fish hatcheries, public parks or mines [<http://www.floatingislandinternational.com/applications/water-quality/>].

These are the four main objectives that our project tries to complete:

1. Improve water quality in the Danube region using specific plants that purify the water and enable usage of the clean water for the agriculture.
2. Attract tourists to the less developed countries and make profit from the tourism. One of the ideas how to attract tourists to the floating islands that will be located in the poorer countries on the Danube region is organizing cultural events, e.g. modern art exhibitions from (young) Romanian, Croatian, Slovenian etc. artists. These exhibitions could travel to other countries that are connected with the Danube and can be held on the floating island located in each country. Supporting similar exhibitions and young artists money resources from the different budget sources (e.g. funds for young artists) can be used.

3. Open the new jobs and give young and inexperienced people opportunity for employment. Educated and less educated people without working experience will have opportunity and advantage to work on the floating island, e.g. event planners, travel guides, maintenance workers, various technicians etc. Having in mind that maintaining the floating island will not be an intensive labor (as the construction), people could work until the end of their working period instead of going in early retirement.
4. Give the local people public places where they could get together and socialize. Idea is to create safe(r) society giving children the public place where they can do sports, learn about culture and also give them the opportunity for better education. Generally, moving the children from wandering the streets will be the main motto.

## FUNCTIONAL DEMANDS

Constructed floating islands differ from their natural counterparts through their initial substrate formation and include an initial man-made raft (Vogel, The Effects of Artificial Floating Wetland Island – Construction Materials on Plant Biomass, 2011). The materials for the constructed floating island raft might be wide ranging, but should be durable, functional, environmentally sensitive, buoyant, easily anchored, and must not be too heavy (Kerr-Upal et al., 2000; Vogel, 2011). If materials are anything but durable, functional, environmentally friendly etc., the constructed floating island might not reach the intended goals of the project and might fail.

Generally, artificial floating islands can be classified into two groups (Vogel, 2011):

- a) 'wet' floating islands, which have vegetation permeating into the water column
- b) 'dry', with vegetation enclosed within the artificial island mass.

Many materials were used for artificial island frames (Vogel, 2011) and island substrate including wood, PVC, Bamboo, Styrofoam, burlap, coconut fibers, chicken-wire, and jute. All islands were initially planted with *Panicum hemitomon* (maidencane), but it was found (Vogel, 2011) that the PVC and Bamboo frames were the most buoyant and as a result led to greater species diversity than islands with less buoyant frames. Except for the materials, it is important

to explain the shape and the usage of the floating islands in order to achieve the project objectives.

Artificial green floating islands would be static and of various sizes, depending on the width of the riverbed as well as on the level of pollution. They will be adding up to landscape values and their shape could vary from flat platforms containing grass and shrubs to light undulating green surfaces to add up some hills where flatlands dominate. The size of these floating structures in the upper Danube region would be of size suitable for a small picnic place or surface that will contain vegetation that will serve as habitat for birds or for increasing the biodiversity in general in those areas. On the other hand, in the upper region of Danube the water is quite clean, artificial islands would be more of symbolic elements, that would help reinforce a regional identity.

## **ECOLOGICAL BENEFITS**

The green component will play a fundamental role in the present project. Plants won't provide only beauty and shade, but several ecological and social benefits. Plants with rhizospheric microorganisms and bacteria are natural biological cleaners and can significantly improve the quality of air and of river's water. Indeed pollution is one of the major environmental problems of the Danube River and it can significantly affect also human health. Plants' leaves filter air, absorb chemicals from the atmosphere (nitrous oxides, sulfur dioxides, carbon dioxide etc.) and synthesize organic molecules essential for plant tissue and metabolism. This process leads to pollution abatement and carbon sequestration. All plants have also the ability to absorb with the root system organic molecules (phosphates, nitrates etc.) as well as heavy metals from soil and water. Some of these metals are essential for plants' growth and development for example; Iron, Copper, Zinc, Manganese and also Nickel. Certain plants also have the ability to accumulate dangerous toxic heavy metals including Cadmium, Chrome, Lead and Mercury. So the greening of the floating island should include metal accumulating plants and plants which have been demonstrated by recent research works are the most effective in removing pollutants from the environment. Some example could be English ivy, water hyacinth, duckweed etc.

The floating island will also help biodiversity conservation providing habitats for plants, birds, insects and other animals. The artificial habitat will have a fundamental role as wildlife corridor. A wildlife or green corridor is a natural or

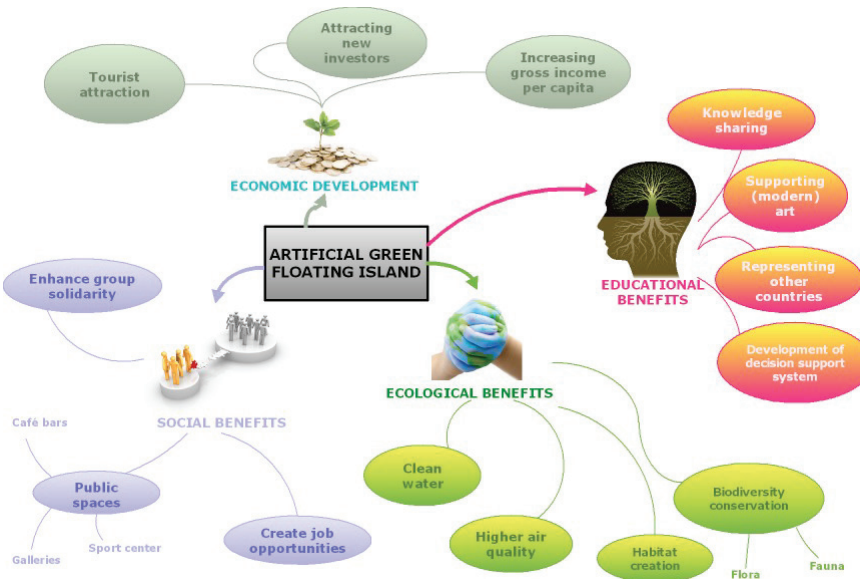
semi-natural surface connecting wildlife population speared by human activities. Creating floating islands will allow the exchange of individuals between populations with consequent moderation of some of worst effects of habitat fragmentation, like decreasing in the area of habitats, isolation of habitats and populations, diffusion of allochthonous (not native) species etc. The use of autochthonous (native) plants is needed to protect the biodiversity of the Danube River Basin. Native plants are well adapted to local environmental and climate conditions and more resistant to pest problems. Planting native forbs, shrubs and trees provide the foliage, nectar, pollen, berries, seeds and nuts that many species of wild animals require to survive and thrive.

## SUSTAINABILITY OF THE PROJECT

Artificial green floating island project will provide the opportunity for the regional development of economically disadvantaged countries by turning riversides into an attraction point.

Through this project the transfer of technology from relatively prosperous countries towards Eastern part of the Danube River Basin will be ensured.

The pollution of the river that has long continued to be an obstacle for the regeneration of the ecological system will be reduced and that might encourage countries for further cooperation.



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