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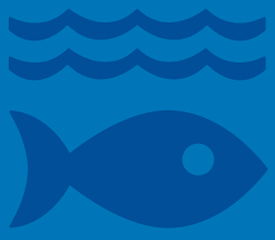
LIFE
BELOW WATER



ITAIPU BINACIONAL

UNDESA – Itaipu Binacional
SUSTAINABLE WATER & ENERGY PARTNERSHIP

# CONSERVE AND SUSTAINABLY USE THE OCEANS, SEAS AND MARINE RESOURCES FOR SUSTAINABLE DEVELOPMENT

## CASE STUDY: ITAIPU AND SDG 14

Activities by Itaipu Binacional supporting implementation of the Sustainable Development Goal 14 (SDG 14) of the United Nations 2030 Agenda for Sustainable Development

Alexandre Marchetti

# 14

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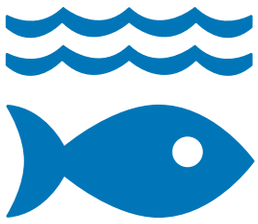

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# WHERE WE ARE


ITAIPU BINACIONAL

Paraguay Brazil

Integration that generates Renewable Energy and promotes Sustainable Development

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# ITAIPU BINACIONAL AND THE UNITED NATIONS 2030 AGENDA FOR SUSTAINABLE DEVELOPMENT

Itaipu is a binational entity created in 1974 by Brazil and Paraguay in order to utilize the Paraná River, along the border of the two countries, to generate hydropower. Today, the Itaipu Hydropower Plant is the largest generator of renewable power in the world (ITAIPU, 2018 a). By the end of 2018, Itaipu had generated a total of over 2.6 billion Megawatts-hours (MWh) since the beginning of its operation in 1984 (ITAIPU, 2019 a).

Since its conception, Itaipu Binacional has followed sustainable development principles as reflected by its integrated actions and programs supporting social well-being, economic growth and environmental protection, contributing to regional prosperity in Paraguay and Brazil. Itaipu's activities in the region have been recognized as excellent examples of "Best Practices" in the effective implementation of the United Nations 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs).

Alexandre Marchetti


# SDG 14: CONSERVE AND SUSTAINABLY USE THE OCEANS, SEAS AND MARINE RESOURCES FOR SUSTAINABLE DEVELOPMENT

Target 14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution

Target 14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans

Target 14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels

Target 14.4 By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics

Target 14.5 By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information

Target 14.6 By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation

Target 14.7 By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism

Target 14.a Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries

Target 14.b Provide access for small-scale artisanal fishers to marine resources and markets

Target 14.c Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in the United Nations Convention on the Law of the Sea, which provides the legal framework for the conservation and sustainable use of oceans and their resources

Source: United Nations,2015.

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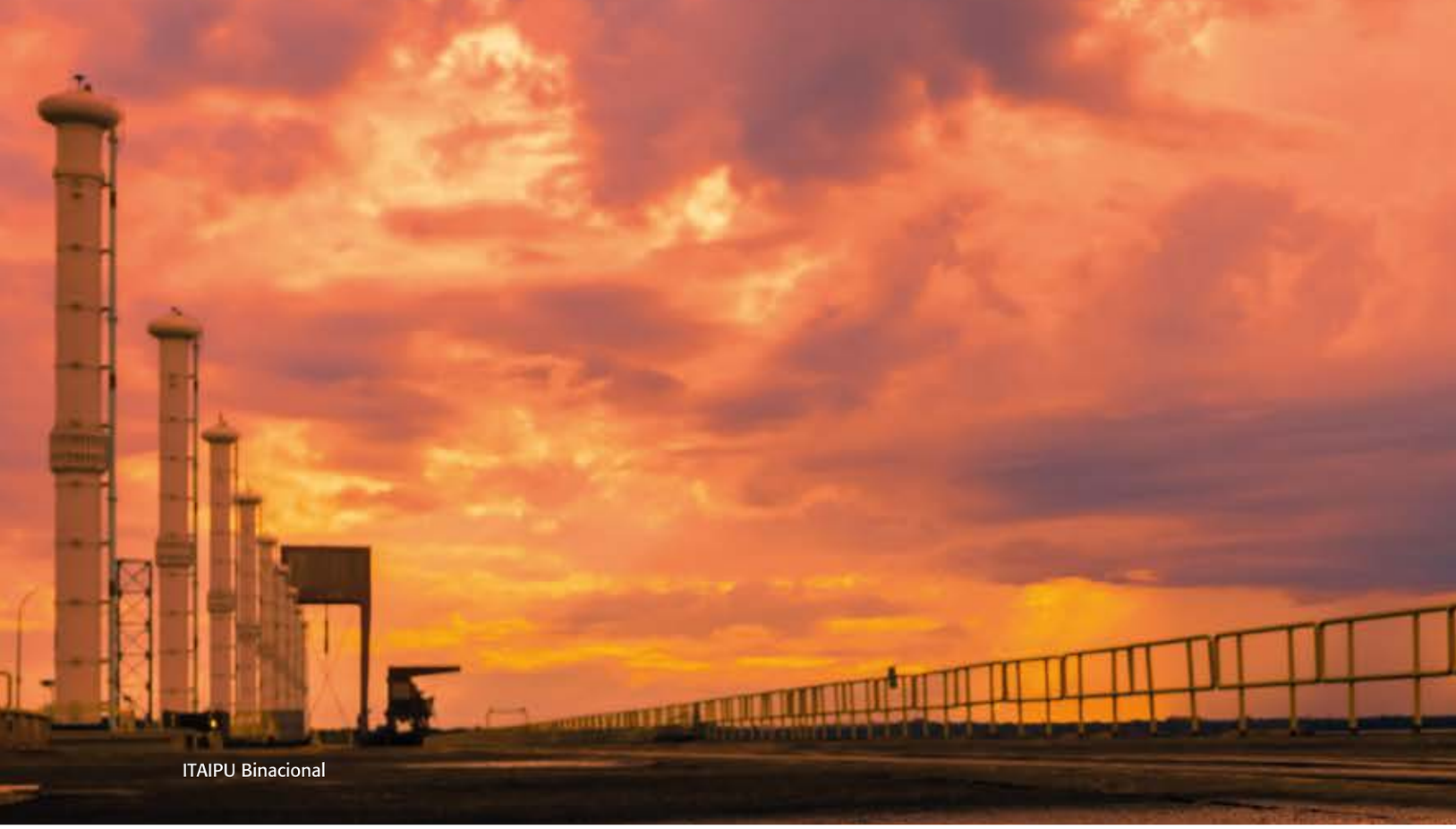

ITAIPU Binacional

# SUSTAINABLE DEVELOPMENT STRATEGY OF ITAIPU

Itaipu's sustainable development strategy recognizes that the effective integrated management, protection and conservation of all terrestrial and inland freshwater ecosystems located in the area are key activities in supporting sustainability and prosperity for the region. These ecosystems include forests and wetlands surrounding the Itaipu Reservoir and cover an area of approximately 100,000 hectares. This area represents the protected belt for the Reservoir along both the Brazilian and Paraguayan margins of the Paraná River. It includes natural reserves, biological refuges, and ecological corridors that protect native flora and fauna and advance research and conservation initiatives. These areas and the Reservoir provide valuable connections among important remnants of the Atlantic Forest located in Paraguay, Brazil and Argentina.

Itaipu has partnered with municipalities, communities, private owners and other stakeholders to promote the restoration of riverside forests, the formation of ecological corridors and the conservation of agricultural and forest soils. These initiatives are part of the overall sustainable development strategy of Itaipu, which is based on an integrated approach to renewable energy generation, water resource management, biodiversity and conservation of terrestrial and inland freshwater ecosystems. This approach is intrinsically linked to the overall objectives of the United Nations 2030 Agenda for Sustainable Development and specific targets of the SDGs on terrestrial ecosystems and biodiversity (SDG 15), water (SDG6), energy (SDG7), climate change (SDG13) and oceans (SDG 14).

Itaipu's vision for 2020 is to be "the generator of clean, renewable energy with the best operating performance and the world's best sustainability practices, promoting sustainable development and regional integration"(ITAIPU, 2018 b).

## Itaipu and the SDG 14

The most important activities in Itaipu's Sustainable Development Strategy with respect to SDG 14 (conserve and sustainably use the oceans, sea and marine resources for sustainable development) are centered on a number of activities that follow the "Source to Sea" approach, which acknowledges a continuous system of flows that go from source downstream to oceans, and that activities along this chain can have considerable impacts at all stages. Some of these activities include: practices for soil and water conservation; mitigating activities of agrochemicals and other hazardous materials from rural areas; conservation of protected areas; environmental monitoring and control of water and sediments, and sustainable closed systems fish farming, such as Biofloc technology, among others.

# 1.

# FROM THE SOURCE TO THE SEA

The exact venue where Itaipu dam was later built. On the left bank, Brazil. On the right bank, Paraguay.
Alexandre Marchetti - Itaipu Binacional

## Objective and description

Itaipu recognizes the importance of using a Source-to-Sea approach in the management of natural resources to be able to achieve sustainable development. A Source-to-Sea system approach considers the many flows that exist of water, flora, fauna, sediments, pollution, materials, etc., which can cause significant impacts on activities and ecosystems from the source downstream and all the way into the sea. Itaipu is considered a source, as it is part of an upstream area where the freshwater directly drains from the catchment into the Reservoir, and then, to the estuary of the Plata Basin that opens to the southern South America Atlantic Ocean. This integrated perspective calls for comprehensive management, assessment and monitoring not only of separate parts or zones, but of the overall natural regional system, including crossing national borders if necessary. The idea is to look at the land-rivers-ocean flows as a "continuum" at the broader regional or global scales. As in the case of climate change, this approach is able to identify the real links between cause and effect, even though some links may be associated with large physical distances and long periods of time.

Many of the activities conducted by Itaipu are linked to the flow chain that goes from terrestrial ecosystems to freshwater ecosystems and, ultimately, oceans, creating impacts all along the way.

Itaipu, in partnership with several academic institutions, research foundations, municipalities, governmental and non-governmental organizations develops projects in the Paraná Watershed Basin 3, the last portion of the large Paraná River Basin, in Brazil, in order to minimize the impacts over water resources that may arise from the use and occupation of the territory. These actions

allow Itaipu to maintain the water quality and to reduce the amount of sediment that goes into the Reservoir.

Some of the actions include soil conservation, road adaptation, rural sanitation, and the implementation of fences and seedlings for restoration of riparian forest. Soil conservation has great positive impact on decreasing erosion and sediment carried to the Reservoir and, consequently, the siltation and the sediment load in the Mar Del Plata estuary. Itaipu also supports the implementation of rural community water supplies to clean machinery, in order to mitigate the entry of pesticides into the waters. The Entity also promotes projects for the implementation of biomethane plants, taking advantage of the large amount of swine manure produced in the region, avoiding the contamination of water with waste, and at the same time, producing sustainable biofuel.

In order to promote the technological improvement of continental aquaculture with focus on reducing the organic load and effluents released to the environment, Itaipu is working on the implementation of a closed production system demonstration unit, for the development and dissemination of sustainable technologies for aquaculture, since this is one of the main users of water resources in the region. The demonstration unity uses a microorganism enhancement technology, called Biofloc, in a closed system that utilizes only 1% of the water in comparison to the traditional excavated fish tanks.

The enhancement of local microorganisms allows the improvement of water quality by "recycling" the excess of nitrogen and phosphorus and returning clean water to the aquatic environment.

Located in the Bela Vista Biological Refuge of Itaipu, the Demonstration Unit is a disseminator of new practices, applicable to the reality of the local productive arrangement, aiming at longevity of the production chain, guided by the rational use of natural resources. This project represents a main focus of this "Source to Sea" action to minimize nutrient input to reservoir waters and the overall use of water and streams eutrophication. If large quantities of upstream water are used for agricultural irrigation, or if the water is polluted by industries, the effects can accumulate downstream and ultimately reach marine ecosystems.


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In coordination with the aquatic ecosystem conservation actions and through partnerships, Itaipu conducts the monitoring of water quality of the Watershed Basin from direct and indirect runoff. In this case, the objective is to analyze the improvement of water quality due to the actions taken by Itaipu in the Watershed. Itaipu has additionally been developing a project in partnership with the Itaipu Technological Park Foundation (FPTI) and the University of Latin American Integration (Unila) for studies of micropollutants in different environmental matrices (water and soil). The objective of this research is to identify the emerging pollutants found in water and their action on local biodiversity. The monitoring of micropollutants and the mitigation of their impacts represent examples of activities by Itaipu that protect water and ecosystems from Source-to-Sea. Micropollutants have a direct effect on the water ecosystems of the region including the fresh water in the Paraná River basin and, downstream, the salty water in the Plata estuary in Argentina.

Another important action is the Itaipu recycling program, developed in partnership with 55 municipalities and garbage picker associations. By implementing a solid recycling program in the region, a large part of plastics and other solid waste that could reach the rivers and, ultimately, the sea, is appropriately managed and recycled.

Soil conservation and rural sanitation actions have been carried out since 2005. Actions to promote aquaculture activity have been undertaken since 2003, in net pens, and in the Biofloc closed system since 2017. Environmental monitoring has been carried out before the filling of the Reservoir, in 1982, and has been continued and expanded until the present. The study of micro pollutants started in 2016.

## Related Targets

The activities carried out by Itaipu in the Watershed Basin contribute to preventing and reducing marine pollution of all types, especially from land activities, given the reduction in nutrient pollution. These are the main objectives of Target 14.1. Fostering the use of closed aquaculture systems, for example, reduces the runoff of production effluents generated during cultivation into water bodies. The production of one kilogram of fish in traditional systems requires more than 20,000 liters of water, and, in the case of the overall Paraná-based production, it is estimated that 2.58 billion cubic meters of water are used. With this scenario, support for the development and dissemination of sustainable models in aquaculture ensures a healthy environment for fish growth and reproduction and avoids the need for water renewal. These actions should reduce the possibility of negative impacts downstream and ultimately in marine ecosystems.

Rural Sanitation activities are other examples of minimization of nutrient input from the basin that consequently goes to rivers and the sea. Using the waste from agriculture developed in the region for the production of biogas, besides being an economically viable activity, significantly reduces nutrient runoff to the rivers, and consequently, eutrophication, which could end up affecting downstream ecosystems.

Environmental monitoring actions support Target 14.1, since they detect nutrients in water. In addition, they indirectly contribute to Target 14.3, which relates to enhanced scientific cooperation at all levels. The monitoring is conducted through scientific cooperation with academic circles to identify processes and their influence on the aquatic ecosystems. In the specific case of micro-pollutants, the study is binational, being carried out in Brazil and in Paraguay. For a region that has a strong agricultural economy, this integrated work makes it possible to identify the types of pesticides present, to quantify those with the highest incidence, and to evaluate the degradation power of these substances by soil and river microorganisms, thus adding to the knowledge base for the rational use of these substances.

## Challenges

The Itaipu Reservoir is located in the largest fish producing region in Brazil. In addition, the production of poultry, pork, soy and corn stand out in the region, both in Brazil and in Paraguay. High production demand and contamination of water resources, linked to human consumption and food production, are challenges to be faced when combining environmental and productive sustainability, especially in the medium and long term. In the case of monitoring emerging micro-pollutants, the challenges are methodological, i.e., to detect and quantify which are the main compounds and degradation products present in the water and what could be their impacts in water bodies downstream including oceans. In addition to detecting and quantifying the pollutants, their interference on biodiversity and on human health represents another challenge.

In general, methodologies to assess the overall impacts of actions using the Source-to-Sea approach are still being developed, and represent a very challenging task, especially when related to methodologies to account chemical micropollutants and plastic degradation by-products, such as microplastics and nanoplastics, and their effect on aquatic fauna and human health. Nevertheless, progress is being made to define appropriate ways to analyze, plan and assess systems considering the entire social, environmental and economic aspects of the flows from the source to the coastal areas and even to the open ocean. (Granit et al, 2017)

## Lessons learned

Protocols for the reduction of water use in through fish production were generated during the technological development process. The results showed that it is possible to increase productivity by up to 100% and to reduce water consumption by 95%. However, the high cost of implementation and the need for skilled technical labor are disadvantages of this production model. Closed systems, such as Biofloc, are highly efficient and important in terms of biosafety, especially due to the possibility of serious widespread pathologies, which are difficult to control and eradicate, and can endanger the entire regional production chain.

In the case of micropollutant monitoring, the first study developed indicated the need for methodological development to detect the main micropollutants and then the quantification of the same. Advanced analytical detection techniques – such as screening employing high technology using gas phase or liquid phase chromatography applied to mass spectrometry (GC-MS or LC / MS) – can make such studies possible. The identification of the micropollutants in the waters and the factors that may compromise the aquatic environment favors the establishment of rational ecosystem conservation and management programs.

## Results

For the closed aquaculture production system (Biofloc), Itaipu's biggest challenge is to implement this model in the west of Paraná, in Brazil, providing greater efficiency, water security and long-term competitiveness. Research and development activities with Biofloc began in 2014, with tests conducted for the production of fingerlings and juveniles. The main results (2017) are associated with high survival rates (over 90%), high zootechnical performance, and controlled management of all effluents produced.

The first phase of the Micropollutant Monitoring Project in the Paraná Watershed Basin 3 focused on the analysis of atrazine, glyphosate and their transformation products (DIA and DEA, and AMPA, respectively). The project monitored these pesticides at 21 points in the watershed, more specifically in first-to third-order rivers, such as streams that begin on the farms in the area. The designation of the sampling area was essential to the success of the project, as it encompassed properties with significant agricultural production in the study region. The results of the collections indicated that in

approximately 30% of the analyzed samples analytes of interest were detected, while in a smaller number of samples it was also possible to quantify them. This is because the quantities found were at levels of concentrations lower than those provided for in the legislation (CONAMA Resolution 357/05) and the methods' ability to quantify. The low detection and quantification of the main pesticides used in the region led to modify the methodology, as described above, using a screening and then, an assessment of the interference with local biodiversity, including different aquatic trophic chains.

To monitor the results of the closed-system aquaculture model, Itaipu has the biofloc fish production laboratory at its hydroelectric power station, where the production of fingerlings is done for supply to small-scale regional fish producers, release and marking of migratory fish, and for training and skill building. The entire production cycle is monitored, and at the end of cultivation an index of production per volume of water used is generated. All Research and Development actions are developed via agreements with universities and research institutions. Technology transfer is carried out via training courses for regional commercial producers, in addition to publishing the developed content via articles and technical notes at technical-scientific events in the area of fishery resources and aquaculture. For Micropollutant Monitoring studies, there is not yet a specific action with communities and local authorities, because the project is still in the phase of detection studies.

The activities being conducted by Itaipu related to terrestrial and water ecosystems and its integrated approach to sustainable development supports the concept of “Source to Sea”. These actions demonstrate Itaipu’s commitment to the minimization of negative impacts that could affect all the different stages of the flow of natural resources including across borders and that could ultimately affect the ocean.

Víctor Azcona

# INTERLINKAGES WITH OTHER SDGs

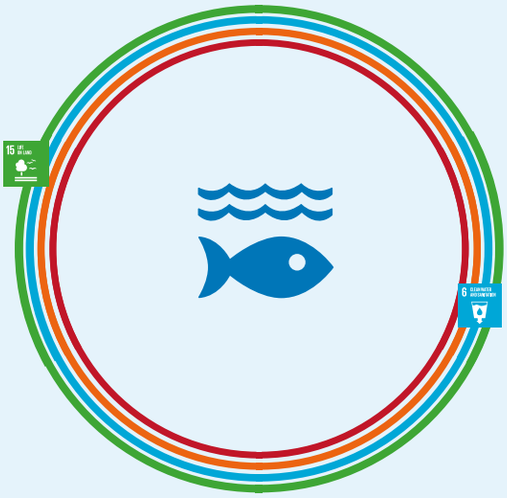
# SDG14 OCEANS

The interlinkages between oceans (SDG14) and other SDGs include those related to water (SDG 6) given the considerable number of activities being conducted by Itaipu with respect to water. It is also related to the terrestrial ecosystems (SDG 15) since Itaipu has a very strong program on conservation, biodiversity and on reducing impacts from agrochemicals and other hazardous materials. Another major interlinkage is with activities of aquaculture or fish production which are related to food security (SDG 2).

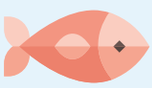
**WATER AND TERRESTRIAL ECOSYSTEMS**

## Aquaculture production system:

**high survival rates (over 90%), high zootechnical performance, and controlled management of all effluent produced**



## BIOFLOC FISH PRODUCTION



**microorganism enhancement technology that utilizes only 1% of the water in comparison to the traditional excavated fish tanks**

## Micropollutant Monitoring Project:

**analyze the improvement of water quality due to the actions developed by Itaipu in the watersheds.**

# CONCLUSIONS


Víctor Azcona

The sustainable development strategy of Itaipu and its comprehensive program of activities related to the optimum integrated management of water resources, protection of water-related ecosystems and the territorial development of the region represent an excellent example of field implementation of the UN 2030 Agenda for Sustainable Development.

The strong interconnection between water and energy is evident for Itaipu, and the optimum management of these two resources is key to securing sustainable development and prosperity for the people of Paraguay and of Brazil, and for protecting all of the ecosystems of the region. The integrated management of micro-watersheds and territorial development is as important to Itaipu as the generation of renewable energy.

Itaipu's record as one of the best examples worldwide of successful binational integration, headed by Paraguay and Brazil, is indeed manifested in the sustainable way natural water resources are being managed. Partnerships among companies, government agencies, institutions and academia are fundamental for the success of Itaipu's actions. The support among these actors, through the participative community management directly linked to socio-environmental actions promotes sustainable development and prosperity for future generations.

The practices of environmental management and territorial development depend directly on the awareness and involvement of the community. Itaipu's support related to capacity building, through workshops, seminars and courses aimed at the community involvement with environmental practices has resulted in positive and lasting results. The change in the culture and habits of the population towards a sustainable development strategy is a long process that must be strongly based on education and the exchange of experiences among all stakeholders.

Itaipu recognizes the importance of following a "Source to Sea" approach as reflected in many activities being undertaken that could have impacts on the natural resource flow chain from source downstream and potentially all the way to the ocean. This integrated perspective is being implemented by Itaipu with its comprehensive management, assessment and monitoring not only of separate parts or zones but of the overall natural regional system including crossing the national borders of the region.

# REFERENCES AND ADDITIONAL READING SOURCES

- Cabrera, M. B. R.; Toci, A. T.; Boroski, M; Benassi, S. F.; Souza, J. E. ; Cordeiro, G. A. (2017). Monitoramento de fosfato em águas superficiais na Bacia Hidrográfica do Paraná 3. Poster session presented at: VIII Encontro Nacional de Química Ambiental. Curitiba, Brazil.

- Casado, C. M. (2014). Efeito da implantação de Biodigestores em propriedade rurais no município de Marechal Cândido Rondon/PR para a melhoria da qualidade da água. (Master´s thesis). Center for Engineering, Modeling and Applied Social Sciences, Federal University of UFABC.. Santo André, SP, Brazil.

- Exterkoetter, R.; Rozane, D. E. ; Boroski, M; Toci, A. T.; Cordeiro, G. A.; Mendonca, C. F. R. (2017). Avaliação de diferentes cartuchos de extração em fase sólida na determinação de glifosato e AMPA em solo. Poster session presented at the XXXVI Brazilian Congress of Soil Science. Belém, Brasil.

- Exterkoetter, R. (2017) Determinação de glifosato e metabólitos em sedimentos da Bacia do Paraná 3(Master´s thesis) - Federal University of Paraná, Itaipu Technological Park Foundation. Foz do Iguaçu, Brazil.

- Flora, A. D. ; Toci, A. T. ; Boroski, M ; Cordeiro, G. A. ; Benassi, S. F. ; Ferrao, M. F. ; Sirtori, C. (2017). Desenvolvimento de metodologia para análise de atrazina e seus produtos de degradação (DIA e DEA) empregando microextração líquido-líquido dispersiva e GC-MS. Poster session presented at the VIII National Chemistry Meeting, Curitiba, Brazil.

- Flora, A. D. (2018). Desenvolvimento de metodologia analítica para determinação de atrazina e seus principais metabólitos nas águas superficiais da Bacia Hidrográfica do Paraná 3 (Master´s thesis). Federal University of Rio Grande do Sul, Itaipu Technological Park Foundation. Foz do Iguaçu, Brazil.

- Gabardo, R. P.; Benassi, S. F.; Boroski, M; Cordeiro, G. A.; Toci, A. T.; Liz, M. V. (2017). Teste de adsorção dos analitos Carbendazim, Atrazina e seus metabólitos em diferentes materiais filtrantes para o preparo de amostras ambientais. Poster session presented at the VIII National Chemistry Meeting, Curitiba, Brazil.

- Gabardo, R. P. (2018). Aplicação do métido QuEChERS no preparo de amostras de águas superficiais para determinação de Atrazina, Desisopropilatrazina (DIA), Desetilatrazina (DEA), e Carbendazim por LOC-DAD. Dissertação (Mestrado em Ciência e Tecnologia Ambiental) Universidade Tecnológica do Paraná.

- Granit, J.; Lymer, L.; Oslen, S.; Tengberg, A.; Nommann, S. and Cluse, T. (2017) A Conceptual framework for governing and managing key flows in a source-to-sea continuum. Water Policy, 19673-691.

- ITAIPU Binacional. (2018 b). Comunicación de progreso y reporte de sostenibilidad. Retrieved from: https://www.itaipu.gov.br/es/responsabilidad-social/comunicacion-de-progreso-y-reporte-de-sustentabilidad

- ITAIPU Binacional. (2018 c). Plan Director de Gestión Sociambiental Appendix I.

- ITAIPU Binacional. (2018 a). Sustainability Report. Foz do Iguaçu, Paraná: Social Responsability Advisory Office.

- ITAIPU Binacional. (2018 d). Resolución de Directorio Ejecutivo 276/18

- ITAIPU Binacional. (2018 e, March 3) Ponen en marcha moderno equipo de hidrografía, único en Paraguay.Retrieved from https://www.itaipu.gov.py/es/sala-de-prensa/noticia/ponen-en-marcha-moderno-equipo-de-hidrografia-unico-en-paraguay

- ITAIPU Binacional. (2018 f). Agua limpia y saneamiento. Retrieved from https://www.itaipu.gov.py/es/pagina/agua-limpia-y-saneamiento

- ITAIPU Binacional. (2019 a). Generación. Retrieved from http://www.itaipu.gov.py/es/energia/generacion

- ITAIPU Binacional. (2019 b). Reservoir. Retrieved from https://www.itaipu.gov.br/en/energy/reservoir

- ITAIPU Binacional. (2019 c). Documentation Center. Retrieved from http://intranetbr/centrodedocumentação/.

- ITAIPU Binacional. (2019 d, January 29). ITAIPU recupera 2.300 hectáreas de bosque, gracias al trabajo de reforestación más grande de la región. Retrieved from https://www.itaipu.gov.py/es/sala-de-prensa/noticia/itaipu-recupera-2300-hectareas-de-bosque-gracias-al-trabajo-de-reforestacion-

- ITAIPU Binacional. (2019 e). Paraná river. Retrieved from https://www.itaipu.gov.br/en/energy/parana-river

- Itaipu Technology Park (PTI) (2018, July 3). Projeto vai analisar influência dos micropoluentes no solo e biodiversidade na Bacia do Paraná 3. Retrieved from https://pti.org.br/pt-br/content/projeto-vai-analisar-influência-dos-micropoluentes-no-solo-e-biodiversidade-na-bacia-do

- Mendonca, C. F. R.; Pezza, H. R.; Benassi, S. F.; Cordeiro, G. A.; Boroski, M; Exterkoetter, R.; Toci, A. T.( 2017) Método analítico para determinação de glifosato e AMPA nas águas superficiais da Bacia Hidrográfica do Paraná 3. Poster session presented at the VIII National Chemistry Meeting, Curitiba, Brazil.

- Mendonça, C. F. R. (2018). Determinação de glifosato e AMPA nas águas superficiais da Bacia do Paraná 3 (Master's thesis). Institute of Chemistry, Araraquara, Brazil.

- Mendonça, C. F. R. (2018). Determinação de glifosato e AMPA nas águas superficiais da Bacia do Paraná 3 (Master's thesis). Institute of Chemistry, Araraquara, Brazil.

- United Nations. (2015). Transforming our world: the 2030 Agenda for Sustainable Development, A/RES/70/1.

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## LIFE BELOW WATER