

Beijing / Zhengzhou China



the second s



APPEALS AND RECOMMENDATIONS

SESSION

21/25 october 2019

Bringing together actors committed to the development and protection of the world's rivers, Initiatives for the Future of Great Rivers (IFGR) offers an original, international and multidisciplinary forum open to stakeholders and oriented towards action. It acts to conceive the river of tomorrow and contributes to enriching national and international debates on water and climate change. Indeed, rivers are situated at the heart of current climatic and environmental issues (energy, production, food security, public health, mobility, etc.) and could also provide solutions for building a sustainable world.

Founded by CNR, the multipurpose concessionary of the River Rhone and France's leading producer of 100% renewable electricity, IFGR is an association in the general interest chaired by Erik Orsenna, an economist and writer, member of the prestigious Académie Française.





IFGR 2, rue André Bonin - 69004 Lyon - France Tel: + 33 (0)4 72 00 69 48 - contact@iagf-ifgr.org www.initiativesrivers.org

Introduction

The speed of economic growth over the last 30 years in China has consolidated the country as the world's second most powerful economy and given rise to a middle class. But it has severely damaged the environment (air, soil and water pollution) and the living conditions of a forever increasing population in cities (60% of the country's 1.4 billion inhabitants).

Its energy mix, heavily dependent on coal (69% of energy production in 2018) also contributes to the emission of a quarter of global CO2 emissions. In view of this, the Chinese authorities recently decided to make profound changes in its development model. The construction of "an ecological civilisation", that is the new ambition announced in 2012, and written in the Constitution. It has been deployed through an array of sectoral public policies aimed at better preserving natural resources, improving air and water quality, developing renewable energies, and so forth. It should be achieved by 2030, when the country aims to have stabilized its greenhouse gas emissions and raised the share of decarbonated energies to 20% of its energy mix, in line with its commitments to the Paris Climate Agreement in 2015.

This Chinese version of sustainable development is characterised by a strategic model of governance that combines protection and growth and recognises the values of environmental services (summed up by the slogan "*Green is Gold*"), as explained by Professor Wang Yi, member of the Permanent Committee of the National Assembly of the People's Republic of China and of the Chinese Academy of Sciences, when opening our session at the French Embassy in Beijing.

The challenge is to favour sharing experiences. To avoid repeating the mistakes of the past, we must seek to propose new solutions to promote biodiversity and ecosystem services. We have acquired a certain level of experience and are, moreover, faced with the same challenges. Therefore, we must act to work hand-in-hand to make progress with the integrated management of river basins around the world.

PROFESSOR WANG YI,

VICE-PRESIDENT OF THE INSTITUTE OF SCIENCES AND DEVELOPMENT OF THE ACADEMY OF SCIENCES OF CHINA, MEMBER OF THE PERMANENT COMMITTEE OF THE PEOPLE'S NATIONAL ASSEMBLY How will this political strategy affect rivers? What are the stakes? What lessons can we learn from China and what contributions from elsewhere could be of use to it? These questions underpinned the decision of Initiatives for the Future of Great Rivers (IFGR) to organise its first international session held in Asia, at the invitation of the Yellow River Conservancy Commission, a member of its Rivers Committee since 2018.



The IFGR delegation received by the French Embassy in Beijing

France, along with the European Union and its European partners, stands next to China so that an ambitious and realistic framework for world governance post-2020 will be adopted during the fifteenth United Nations Conference on biodiversity, called COP15, at Kunming at the end of 2020.

> LAURENT BILI, FRENCH AMBASSADOR TO CHINA

The national political context has since confirmed the pertinence of our approach, as "the high-quality ecological protection and development of the Yellow River basin" were declared a "major national strategy" by President Xi Jinping in mid-September to reconcile economic development, the well-being of the people and the country's natural and cultural heritage.

By taking the example of the Yellow River – the cradle of Chinese civilisation and the country's second longest river – and by devoting its works to biodiversity, IFGR placed emphasis on two essential topics that it promotes:

• THE LINK BETWEEN CLIMATE AND BIODIVERSITY:

There is unity between living beings and water lies at its centre. As mentioned by Zhang Yan, director of the IUCN in China, more than 90% of natural disasters are linked to water. On the contrary, reserves of freshwater, which make up only 3% of the total volume of available water, are vital for all forms of life on Earth and under water. **Water is a key element in the interaction of human beings with their habitats and reveals the imbrication between managing a natural resource, both salt and fresh water, and maintaining diversity and health.** This complexity makes it necessary to avoid compartmentalisation, and to find synergies or at least compatibilities between climate change mitigation, the conservation of biodiversity, food security, and development.

On the occasion of President Emmanuel Macron's official visit to China a few days after our session, Beijing Call for Biodiversity Conservation and Climate Change launched by the two Heads of State on November 6, treated the topics of climate change and biodiversity on an equal footing for the first time. This declaration was based on the latest results made available by scientists (reports from the IPCC¹ and the IPBES²) that detail these intertwined challenges.

• COOPERATION FOR SEEKING SOLUTIONS:

It is essential to exchange knowledge and practices to "understand the role played by rivers, access to water and its distribution in a global system of understanding environmental solutions and the new balances that we must find to avoid major upheavals of life (...). China is, like us, increasingly aware of the problems confronting us, especially regarding managing living resources and it wishes to seek solutions", declared Nicolas Chapuis, European Union Ambassador to China. Significant cooperation exists already, with in particular bilateral agreements between France and China and the China Europe Water Platform, a forum of Sino-European exchanges set up in 2012. **Furthermore, the IFGR conference appeared on the agenda of the Franco-Chinese Year of the Environment.**

IFGR fuels this cooperation thanks to a very open dialogue begun with the Yellow River Conservancy Commission and exchanges between multidisciplinary and international experts. It aims to contribute to the major meetings of 2020 dedicated to biodiversity³, by giving a voice to rivers.

¹ Special reports on the impact of global warming of 1.5°C; on the links between climate change and soils; on oceans and the cryosphere - IPCC- 2018/2019.

² Global assessment report on biodiversity and ecosystem services - IPBES - May 2019.

³ IUCN World Conservation Congress, Marseille (France) in June; COP15 at Kunming (China) in October 2020.



From taming the dragon to new environmental challenges

> A complex river basin with a fragile ecological system, the Yellow River is known for its catastrophic floods and droughts. "The dragon" has now been tamed thanks to large-scale hydraulic works carried out but is faced with new challenges.

A colossal sediment load

5 464 km

long (the world's 6th longest river, the 2nd longest river in China after the Yangtse)

nrovinces

A watershed of

795 ()

crossed

with **a** population of

1(

million

The morphology of the Yellow River, or *Huang He*, is highly specific with diverse climates affecting it from its source to the sea, over more than 5,460 km, and the highest sediment load in the world (35 g/L on average). Its name stems from the alluvions (silt, mud, sand, etc.) released by soil erosion on the huge Loess plateau and which give it a muddy colour (*huang* means yellow in Mandarin).

A natural phenomenon, soil erosion has nonetheless accelerated in recent years due to human activities.



These sediments represent an average annual volume which has already reached 1.6 billion tonnes of which only a quarter is transported to the Bohai sea. The rest accumulates in the river, causing the rise of its bed by 5 to 10 cm a year on average. On its lower course, the river lies thus 4 to 6 metres above the surrounding cities and farmland, forming a "suspended river". This difference is even more marked in certain places, reaching up to 20 metres, requiring increasingly narrow and ever higher channelling, resembling "an ascension to the sky" for Elisabeth Ayrault, Chairwoman and CEO of CNR (France).



Where the river joins the see.

An average discharge of 2 571 m³/s though highly variable

throughout

the year

A difficult river, between floods and droughts

The Yellow River is the world's most dangerous river, known for its disastrous floods that have caused it to change its course. It has been nicknamed "*China's sorrow*". Ever since historians have kept records, since 602 BC, **the river has changed course 26 times and caused more than 1,000 major floods** – i.e. at least one important change of course once a century and almost one major floods every three years – that have led to the death of millions of people.

The basin's long history has also been marked by droughts, which have recently become a serious problem due to climate change and ever-increasing withdrawals of water to irrigate farmland, and supply cities and industries. **Water resources are becoming scarcer** in a country characterised by considerable imbalances in water supply: China possesses only 7% of the world's freshwater, whereas it has 21% of the planets' population.



What is more, 80% of the country's water resources are found in the south for 55% of the population.

Some northern provinces have exceeded the threshold for water deficiency, with less than 500 m³ of water per inhabitant per year. A colossal project to transfer water via three diversions from the south to the north is being carried out but the situation could get worse. **Available water resources in the Yellow River basin (estimated at 66.1 billion m³, including 17.2 billion m³ of underground water) are under pressure, with a constant increase in demand since 1950, while rainfall levels are decreasing. Between 2007 and 2014, withdrawals increased by 10%, especially for agriculture which represents 84% of total water consumption in the watershed for more than 8 million hectares of land.**

A peak was reached in 1997: the Yellow River dried up along 704 km of its lower course for a record period of 300 days. It no longer reached the Bohai Sea!

A basin of life that must preserved and developed

The Yellow River gave rise to the Chinese civilisation more than 5,000 years ago. Its basin was the political, economic and cultural centre of China, and the home of eight dynasties. The basin of the *"mother river"* **remains a driving force, representing 2% of China's water resources, 7% of national GNP and 9% of the population**, mostly concentrated in the lower third of the basin.



The engineers of the Yellow River Conservancy Commission control an array of indicators from this control room: discharge, reservoir levels, water quality, etc. along more than 5,000 km of the river's course. They supervise allocations of water resources, by operating the gates of the reservoirs remotely.

Since it was founded in 1946, the challenge for the Yellow River Conservancy Commission has been to reduce the seriousness of floods and droughts, the accumulation of sediments and to develop sustainable resource management. To do this, **it follows an adaptive model in** which the actions carried out rely on the continuous examination of scientific studies and monitoring that take into account the evolution of needs of the population and, more recently, those of ecosystems.

The progress made is impressive: none of the levees have been breached for more than 70 years and the 90 million inhabitants living in exposed areas (120,000 km² of land lying below the riverbed) have been protected. A huge amount of work has been done to tame the river since the 1950s: levee construction and reinforcement (more than 800 km of levees and groynes along the two banks of the lower course); the construction of 10,000 water reservoirs, with 23 large dams in the middle course, to store water (capacity reached: 62 billion m³) and reduce sediment transport downstream. In addition, the discharge of the river has been maintained over the last ten years at satisfactory levels for all uses, most notably for the environment.

THE MULTIPURPOSE DAM OF XIAOLANGDI

Commissioned in 1999, this facility required an investment of \$4.2 billion (partially funded by the World Bank) and led to the displacement of 200,000 people.

It met six objectives, prioritized as following:

- Manage floods and control sediment transport to protect the population and preserve the environment;
- Combat the formation of ice;
- Supply the population with water;
- **Irrigate farmland**: with 30% of water available for industry, the dam supplies water to 2 million hectares of land, thereby reducing dependence on groundwater;
- **Supply electricity**: with 1,836 MW of installed capacity, the plant produces more than 6 TWh a year, i.e. more than half the annual production of the Rhone!



Towards a new paradigm of economic development

1 million

out of **8 millions** species are threatened with extinction in the world and **2 million** are in great danger

6,5 million hectares of natural forest disappeared every year between 2010 and 2015

35% of wetlands were destroyed between 1970 and 2015 Although immense progress has been achieved by China in recent decades to invest in infrastructures to control natural risks and secure water supplies, it still has to address new environmental challenges to **build an economy resilient to climate change**. China's fast economic growth has undoubtedly allowed hundreds of millions of people to extricate themselves from poverty, but it has placed a considerable burden on the health of humans and nature.

The rate of urbanisation in China has risen from 20 to 60% over the last forty years and the over-exploitation of land has seriously degraded the environment in certain places. This must be added to the natural fragility of half of Chinese territory (regions subject to cold temperatures, drought, heat, salinity, etc.). Overgrazing and deforestation have reduced the capacity of prairies to absorb runoff water; a lot of wetlands have been lost as has their capacity to reduce floods. In the report *Environmental Performance Index* (EPI)⁴ of 2018, which classified the performance of countries in terms of environmental issues, China was ranked 120th out of 180 countries.

According to Marcus Wishart, leading specialist on water resources in China at the World Bank, a longstanding partner of the Chinese government, the governance of water resources has become one of the criteria of the country's economic performance.



⁴ This study was performed by the Universities of Yale and Columbia, in collaboration with the World Economic Forum. It has established a ranking according to two priority requisites for sustainable development: environmental health, which increases with economic growth and prosperity, and the vitality of the ecosystem which is subject to pressure from industrialisation and urbanisation.



It is based on the capacity to fulfil different uses, improve managerial efficiency and better take into account the ecosystem services provided by biodiversity – such as water purification, flood protection and carbon sequestration – that are vital for human well-being.

The global decline of biodiversity therefore represents one of the greatest risks for the 21st century. As mentioned by Laurent Bili, French Ambassador in Pekin: "faced with this phenomenon, it is necessary to act quickly since the cost of inaction will be huge. One figure alone underlines this, the OEDC has evaluated the global cost of lost ecosystem services imputable solely to degraded land at between $\in 6,000$ and $\in 11,000$ billion a year." The same report⁵ estimates the total value of these ecosystem services at between US\$125,000 and US\$140,000 billion, meaning one and a half times global GNP!

The rarefaction of water resources, exacerbated by climate change and combined with the effects of demographic and urban growth, could lead from now to 2050 to a decrease of GNP of 6% in several countries in the world due to its impacts on agriculture, health and income.

MARCUS WISHART, HEAD SPECIALIST ON WATER RESOURCES IN CHINA AT THE WORLD BANK

⁵ OEDC report "Biodiversity: Finance and the economic and business case for action" - May 2019



Fast and major reponses for taking giant steps

> To take this new step to protect biodiversity and develop the river so that water remains a source of life, China has deployed major programmes with rapid impacts. These actions have been placed in perspective with similar actions carried out everywhere in the world, in order to heed the lessons learned for the benefit of all rivers.

Defined ecological areas

In order to better manage water resources, three red lines for water consumption (surface and underground), water pollution and the efficiency of water use by industry and agriculture have been established with graduated targets between 2015 and 2030. **A new Ecological Conservation Red Line** was defined in 2011 and included in a national legal framework for the environment.



Areas covered by the ecological red line.

This new tool, presented by Professor He Pong, of the Chinese Academy of Environmental Science Research, is based on a complex structure that combines mapping, data, planning and constraints. Areas with key ecological functions are of varied types: prairies, forests, deserts, glaciers, lakes or rivers and are selected either as a function of their ecological fragility, or to support five national ecosystem services: the conservation of biodiversity, the conservation of water resources, flood mitigation, soil conservation and the prevention of sandstorms. The next step is to define progressive limits to protect these areas from industrialisation and urbanisation. It is then up to the local authorities to undertake the difficult task of implementing them, since it involves applying very strict supervision of authorised human activities and even closing certain factories or displacing people.

In the long term, **the 15 red line areas will cover a quarter of the territory, i.e. 2.4 million km**². Another oceanic red line has been defined for estuaries, coastal wetlands and mangroves.

2.2.

Restored wetland areas, from source to delta

According to WWF, China has 10% of the planet's wetlands⁶ but 30% of them vanished between 1990 and 2000, due to agricultural expansion and the exploitation of land. An ambitious political programme is being carried out to protect these areas from now to 2030. The priority in the Yellow River Basin concerns two key areas: the source, with its marshes, peatbogs and lakes, and the delta with its coastal wetlands.

AT THE SOURCE

The vast Tibetan plateaux in the province of Qinghai, to the west of China, are where the sources of the Yellow River, the Blue River (*Yang-Tsé*) and the Mekong (*Lancang*) lie, making this region the water tower of China. Several types of wetland coexist there such as alpine prairies, lakes and peatbogs. Their state has deteriorated or else they have disappeared.

To better protect the landscapes and rich biodiversity of this region, China has decided to set up the Sanjiangyuan National Parks of which the National Park of the Source of Three Rivers will be the first. It will be launched in 2020. The goal is to preserve this unique aquatic ecosystem which plays a role in mitigating climate change and acts as an ecological barrier for preserving the water of the Yellow River (half of which comes from the source). **Many actions are being carried out to improve its capacity to retain water, increase its quantity, combat desertification and reinforce the biodiversity of the prairies** (installation of hedges to limit grazing; rotation of livestock grazing areas; plantation of grass in areas where soil erosion is severe) **and reforestation**. Protection also includes the prohibition of mining and hydroelectricity production activities in "core" areas in the centre and "buffer" areas in the immediate surrounding area. Worldwide, wetlands are vanishing three times faster than forests.

More than 1 billion people depend on wetlands for economic reasons and

40% of living species reproduce in these habitats.



⁶ For the Ramsar Convention (a treaty on the conservation and sustainable management of wetlands ratified by 170 countries), the zones considered as wetlands are: lakes, rivers, marshes and peatbogs as well as marine and coastal areas such as estuaries, lagoons, mangroves and coral reefs.



RIVER SOURCES IN WEST AFRICA ARE ALSO THREATENED

West Africa is suffering severe impacts due to climate change. Lake Chad is an emblematic example. In less than 40 years, its surface area has decreased by a factor of ten, from 25,000 km² to 2,500 km². Populations have been displaced, biodiversity has fallen, leading to conflicts; half the African population depends wholly on resources stemming from biodiversity, as recalled by Kabiné Komara (former Prime Minister of Guinea and member of the International Action Council). In Nigeria, 1,500 deaths a year are imputable to conflicts linked to water.

The Fouta Dialon massif, known as the water tower of West Africa, is where the sources of many cross-border rivers lie, including those of the rivers Senegal, Gambia, and Niger. Eight countries (Guinea, Guinea Bissau, Gambia, Senegal, Mauritania, Mali, Niger and Sierra Leone) are concerned to different extents by the water resources stemming from this mountain range. It is vital to protect the abundant water resources it contains. A strategic area for agriculture, livestock, hydroelectricity production and mining (bauxite deposits), the Fouta Djalon is also rich in biodiversity. However, its fragility is worsening due to the impacts of climate change (drought) and human activities. 85% of the population rely on agriculture using traditional practices based on slash and burn practices that lead to soil erosion. As for mining, some of the sites are illegal and consume large volumes of water for their industrial processes, , while the red mud, solid residues produced from processing the bauxite, is extremely acidic and toxic.

The capacity of storing water on the upper course of the Yellow River is a strategic issue and setting up the Source of Three Rivers Nature Reserve is vital for supplying water downstream, as well as for purifying the water.

> LI WENXUE, HEAD ENGINEER, DEPUTY COMMISSIONER OF THE YELLOW RIVER CONSERVANCY COMMISSION

IN THE DELTA

The Yellow River Delta is another important ecosystem, covering a total surface area of 18,000 km² with 5 million inhabitants.

The national nature reserve of the Yellow River Delta was established in 1992 to protect biodiversity. It is the home of more than 1,500 wild animals species, 265 bird species and 400 plant species. The delta is also rich in natural resources, with China's second largest oil deposit. Industrialisation and urbanisation linked to oil extraction have speeded up the delta's morphological transformation, already subject to divagations created by sediment deposits, coastal erosion and land subsidence.

The environmental challenge is formidable: since the 1970s, the delta has shrunk to almost half its former size, 40% of the fish and 30% of bird species have disappeared. The challenge appears not to have been met in full.



NATURE-BASED SOLUTIONS FOR MEDITERRANEAN WETLANDS

In the Mediterranean basin, we observe a loss of 48% for the wetlands since 1970, due to the reconversion of these natural habitats into farmland, water storage areas for agriculture and urban areas.

Coastal wetlands, present in large numbers in the Mediterranean basin, are subject to the two-fold threat of human impacts and the rising sea level (estimated from 10 to 25 centimetres by 2050). Restoring nature to its former state and not resisting at any price provide an answer that is both rapid and efficient, where possible.

Thomas Galewski, project manager at La Tour du Valat⁷ gave the example of the restoration of 6,500 ha of former salt marshes in Camargue. This part of the Rhone Delta is exposed to considerable coastal dynamics – the erosion of 430 metres in 60 years – and is affected by human actions (the erection of dikes to harvest salt) that have also modified the coastline. A new adaptive management strategy has been implemented since 2008, consisting of using these salt farms as a buffer zone between the land and the sea to mitigate the effects of rising sea levels and reincorporate the natural dynamics of the delta. Trying to consolidate the coastline would be difficult, not to speak of the economic cost of building and maintaining dikes. Breaches have thus appeared, pumping stations have been removed, and the ponds and marshes have returned to their natural state. The water of the sea, which had been controlled so that fields were submerged in summer and dried in winter – the contrary of the natural hydraulic cycle – circulates once again between the lagoons.

The ecosystems have been reconstituted: between 2010 and 2016, the landscape recovered its natural vegetation; fish populations that had almost vanished due to excessive salt levels, are now highly diversified, with species present year-round, and there are other more specific species, like the eel. The number of birds has also increased during nesting period and the winter. Nonetheless, specific local characteristics must be taken into account. This solution was suitable for this coast since it is sparsely populated and it is possible to monitor the effects linked to the change made to management practices. Other problems have emerged such as the installation of a new species, the Eurasian eagle owl, which preys on the pink flamingos, an emblematic species of the Camargue. It is also necessary to inform the neighbouring population and tourists about the new landscapes created that are more dependent on the climatic variations.



2.3. Ecological regulation of the river's discharge

A dual regulation of discharges was installed after Xiaolangdi dam. Henceforth, **a third of the annual discharge will be reserved for the environment** (to flush sediments and for other environmental needs):

> The first management plan aims to regulate water and sediments in the downstream section of the Yellow River, before and during the rainy season, from June to September.



There can be 50 metres of sediment accumulated at Xiaolangdi dam in places but, with the sediment flushing and dilution activities begun in 2002, the siltation is under control. These operations are carried out at a cascade of three dams: Wanjiazhai, Sanmenxia and Xiaolangdi. They have been implemented 21 times to bring the river a more balanced sediment dynamics.

• The second plan concerns ecological regulation in spring (from March to May) and has been implemented since 2008 in the form of an artificial flood to favour migration and reproduction of the fish and maintain habitats in the wetlands of the delta, as said by YRCC. Improvements have already been observed regarding the density of young fish in the delta over the last 10 years. However, the fish population of the Yellow River remains fragile, since the dams are not equipped with fish passes to allow crossing them and the effects of pollution and overfishing are still considerable. A third of the 160 fish species identified have disappeared and fish diversity remains very fragile. Fishing has been forbidden in the river from 1 April to 30 June since 2018.

Hydroelectricity is not only a source of energy but also conservation and revenue. All hydroelectricity systems should take advantage of this and be a vector of well-being for local and national populations.

JAMES SPALDING, SPECIAL ADVISOR OF THE PARAGUAYAN GOVERNMENT FOR ENERGY, FORMER GENERAL MANAGER OF ITAIPU PARAGUAY



MANAGING DAMS WHILE TAKING INTO ACCOUNT ENVIRONMENTAL AND HUMAN INTERESTS

Repairing the damage caused by dams, by reserving part of the discharge for the environment, is necessary by insufficient. Managerial responsibility extends over a larger perimeter, to achieve the goals of sustainable development.

South America has shown the way: the second largest dam in the world after that of the Three Gorges in China (14,000 MW vs 22,500 MV), the dam managed by the Binational of Itaipu on the river Parana (Brazil / Paraguay) exceeds in it terms of energy production (more than a MWh a year).

However, its performance is not only productive and financial (since Itaipu's construction, \$5 billion have been paid on both sides of the border). James Spalding, special advisor of the Paraguayan Government for energy and former Paraguayan General Manager, insisted on ITAIPU's social responsibility. This social responsibility led the dam's management to set up an exemplary redistributive mode of governance for the territories and populations. ITAIPU protects 1,500 km of river banks upstream to prevent sedimentation in the river and 100,000 hectares of land (i.e. 7.5 ha protected for 1 MW of installed capacity, the highest ratio in the world). The benefits are tangible and have been quantified: three protected areas supply oxygen for 22 million people a day, three times the Paraguayan population!

ITAIPU's reserves now feature in the UNESCO's Man and Biosphere Programme. Another programme has been carried out with the World Bank to conserve corridors between protected spaces that can be crossed by animals. It also works with local communities to avoid deforestation, by providing alternatives (organic products such as honey and tea).

In France, CNR (Compagnie Nationale du Rhône) is also committed to winning back biodiversity along the River Rhone, with one of the most ambitious projects in Europe. It consisted in delimiting protected areas and reconnecting the river with 80 natural branches, to recreate diversified patchworks of habitats for the fauna and flora and in equipping its dams with fish passes to facilitate the circulation of most of the migrating fish species.

Reforestation to conserve soil and water

Although the development of land for agricultural use continued up to the end of the 20th century, to feed an ever-growing population, the floods caused by soil erosion in the upper courses of the major rivers called into question this impetus. The flood of the Yangtze in summer 1998 afflicted 223 million people, caused death of 3,700 people and resulted in a direct loss of \$30 billion. So, China invested in six major national programmes to protect natural forests and restore millions of hectares of land through natural regeneration and replantation.

67,000 hectares of farmland lost every year due to erosion during the 2000s in China.

The goals expected, measured by field surveys and data analysis, **are both environmental and socioeconomic**, explained Professor Zhang Kun, of the National Administration of Forests and Prairies: improving water quality; reducing soil erosion and maintaining productivity, as well as integrating forests in the economy and strengthening local resilience.

One of these programmes has concerned the Loess plateau, on the middle course of the Yellow River, which is the cause of the sediment load in the Yellow River. **450,000 km² of land on the 640,000 km² covered by the plateau were threatened by soil erosion and water**.

Located in a semi-arid region characterised by little rainfall and plant life, this plateau has always been marked by the meagreness of its vegetation. Human activities have also contributed to its deterioration (overgrazing, felling trees, etc.). Certain areas could lose up to 100 tonnes of soil per hectare every year, and farmland lost its fertility while the desert advanced.





TREES TO COMBAT THE ADVANCING DESERT IN AFRICA

Africa is also resorting to nature-based solutions to circumvent the phenomenon of soil erosion and allow populations to stay in place. In the Senegal river basin, as presented by Hamed Diane Semega, High Commissioner of the OMVS, replanting plays an essential role in combating erosion and controlling flows: the banks are protected either by rockfill or plants, like vetiver. Plant cover is also maintained on the slopes, which favour runoff in the case of heavy rains. Nonetheless, the farmers must be made aware of the damage done by slash and burn practices and bushfires, which degrade plant cover.

A huge project driven by the African Union since 2007: the Great Green Wall. Nearly 8,000 km long and 15 km wide, it will cross 11 countries from east (Djibouti) to west (Senegal). 15% of this barrier of several species of tree has already been planted on the 8 million hectares planned. The aim is to combat the advance of the Sahara and absorb 250 million tonnes of CO2 a year, in addition to feeding the different populations.

Two large-scale operations were carried out between 1994 and 2005 to conserve the water and soils in the framework of the Loess Plateau Rehabilitation Programme⁸ :

- The conversion of 34,000 km² of fields into terraces to replace fields with slopes of more than 25° and thus better retain rainwater.
- Reforestation and replantation with indigenous varieties of plants to improve plant and forest cover: vegetation advanced on the plateau by more than 400 km northwards between 2000 and 2018. The areas replanted have extended from 26,000 to 33,000 km² since 2000, i.e. the surface area of Belgium.

This programme was therefore aimed at **reconverting cultivated land into forests and prairies and the prohibition of any human activity in certain sensitive regions to give nature free rein**. The local populations were involved in the works and the programme's promoters underlined the fact that it raised the living standard of 2.2 million people above poverty level. The farmers received a remuneration besides a compensation and the right to use the land for 70 years. However, with the massive rural exodus, only 20 to 30% of the farmers there previously have remained and the activities that have taken over are controlled (low density for livestock; agroforestry).

The other important result was the **reduction of the sediment load in the basin**: the flow of sediments entering the river has been reduced by more than 100 million tonnes each year; the discharge of the river has increased, due to the improved capacity of the soils to retain rainwater. The effect of replanting completes that of the reservoirs and annual flushes.

30 million hectares replanted

158 million

by the national programme to "reconvert farmland into forests and prairies" on the middle course of the Yangtze and the Yellow River.



The increase of plant cover on the Loess plateau between 2000 and 2018, with the progression of the green line by more than 400 km northwards

⁸ This programme, which concerned 4 provinces, was carried out by the Yellow River Commission with the Ministry of Water Resources and the World Bank. It required an investment of US\$ 500 million over ten years (1994-2005), including a loan of US\$ 300 million from the World Bank.



Lessons for our rivers

Success has been achieved: the river no longer kills in this basin at the heart of Chinese civilisation in which many dangers threatened. But each victory leads to new battles, including that of the environment. China has proved that efficiency is possible in the case of an emergency. However, the conditions for achieving it must be known for progress to be shared and go further in finding a solution for rivers that can provide more life.

The conditions of efficiency

COMBATING THE CAUSES RATHER THAN THE EFFECTS

The first condition for achieving efficiency is to stop fighting the effects and turn to their causes, by taking into account the general evolution of climate change and anthropisation. **It is necessary to understand the origin of problems to avoid resorting to partial solutions.** There will be less water in the world's rivers, while extreme events will be increasingly frequent. What's the point of raising dikes if no action is taken to prevent soil erosion? Regarding this, the work carried out on a colossal scale on the Loess plateau shows nature's amazing capacity for resilience.

China has given us a very good example of what it means to "identify the source of a problem". Regarding the problem of sediments in particular, it is much more interesting to work on the means to avoid what is happening in the river rather than work on how to stop the sediment finding its way into the river. The problem of plastic in the sea is similar.

ÉLISABETH AYRAULT, CHAIRWOMAN AND CEO OF CNR

CHOOSING THE RIGHT SCALE OF SPACE AND TIME

It is necessary to integrate more. On the contrary, fragmentation is synonymous with impoverishment. This is true from the spatial standpoint: the right scale is that of the inhabited basin, covering both the upstream and downstream courses of a river, from its source to its mouth, within a single country or between countries. The other scale is temporal, since what is important is to obtain quick **results**. We no longer have the time to act slowly! But the temptation to change everything must be resisted by conserving the essential, and by learning the lessons of history. According to Erik Orsenna, "Life is a start-up 4.5 billion years old". The scale of time also obliges us to make our decisions with the future in mind. For example, the classification into bounded protected areas and the imposition of red lines are not enough in themselves and must be followed up by protective measures in the field and management plans, failing which biodiversity will continue to decline. This is the observation that prevails in the Mediterranean basin for 40% of its protected sites.



SIMPLIFYING GOVERNANCE, BY GOING BEYOND INSTITUTIONAL FRAGMENTATION

Integration must also be political. In China⁹, but also in many other countries, biodiversity is a global issue that comes up against administrative realities that weaken management, prevent the effective sharing of data to aid decision-making, and dilute responsibilities. In China, more than 200,000 river managers, responsible for rivers in delimited areas, have been appointed to counterbalance the verticality of the administrative system and act locally on water pollution, though there is no feedback as yet on the efficiency of this system.

For the future, the challenge consists in building a global governance system that incorporates the different stakeholders to take decisions and a mechanism to carry out the action plans. Lastly, the actions implemented must be subjected to a scientific evaluation and a monitoring system at the level of civil society.

PROFESSOR WANG YI

⁹ In China, the responsibility for water is distributed between three Ministries: the Ministry of Ecology and the Environment, the Ministry of Natural Resources and the Ministry of Water Resources. At the regional scale, seven basin authorities acting under the aegis of the Ministry of Water Resources manage the major rivers, in coordination with the provinces.

The success and efficiency of the action carried out in the project driven by AFD China on the River Changyuan, in the watershed of the Yellow River (Qixian, province of Shanxi)¹⁰ relied on several key factors, presented by Jin Xiaoting, project manager: the administrations merged to manage together the dam, the wetlands, the forests and tourism, and the management commission endowed itself with monitoring and measurement tools. The tangible results include the following: the dam upstream now holds 2 million m³ of water for the river's biodiversity functions. The local authorities consider the wetlands as additional water reservoirs downstream of the dam, whereas before all the water was stored upstream of the dam to better regulate the discharges.

It is therefore necessary to **simplify governance to achieve integrated water resource management**¹¹. It is also important to **better explain and begin expropriation measures**. This constitutes a challenge for the future for China, in order to associate all the stakeholders with the management of the river.

FIGHTING AGAINST THE TEMPTATION TO DOMINATE EVERYTHING

Rivers have always been shaped by human beings but awareness is necessary that a limit must be placed on the will to dominate. **Replacing domination by partnership between human beings and nature** appears to be the best strategy for the long-term, by resorting to nature-based solutions.

It is necessary to find the right balance between nature and human beings. Dikes are necessary but mangroves can also ensure this protective function very efficiently. On the contrary, leaving territories to their own resilience does not mean that they should be left devoid of any human activity.

> GILLES MULHAUSER, GENERAL MANAGER OF WATER, STATE OF GENEVA, SWITZERLAND

¹⁰ This project carried out between 2011 and 2019 with a loan of €30 million from the AFD restored the rivers hydrological and ecological functions (sealing of the riverbed along 11 km; restoration of banks to their natural state with filtering gardens to recycle wastewater before its discharge into the river; the reintroduction of plants and then fish later on, etc.), while developing new income resources for the villages (tourism, aquaculture, etc.).
¹¹ Integrated water resource management consists in taking into account all the uses and stakes of a watershed when planning such management, including the needs linked to the aquatic habitat and biodiversity.

3.2. Conditions for sustainability

DEVELOPING SPACE HARMONIOUSLY

Half the world's population lives in cities, soon it will be two thirds. **Creating an ecological civilisation therefore also implies an urban civilisation**, by creating better relations between rivers and cities to achieve a better quality of life. Rivers play a small role in the relation between the city and nature, currently given little value in China. Its major cities are heavily polluted and very concentrated. They could look at the examples set by European cities such as Copenhagen and Hamburg for example.

In China the issue of territorial development is also present, with a considerable migratory movement from rural regions in the west to the industrial and urban regions of the east. Furthermore, the authorities are starting to become aware of the negative effects of these territories emptied of any human presence or left to the elderly, by developing new rural revitalisation policies. In the natural reserve of the Source of Three Rivers, the "one family, one ranger" programme is based, for example, on the hiring of one person from each family of the indigenous communities to manage the park (waste collection; surveillance patrol, etc.).





RENATURING WITHOUT DEVITALISING

Managing fragility does not mean preserving nature at any price by excluding human activities. What will happen to China's future food security and independence if the surface area of farmland decreases, and if most of the peasants migrate to cities and rural culture vanishes? Anne-Claire Vial, the President of Arvalis (France) mentioned the case of France. Industrialisation led to the collapse of rural life for the country's farmers in the 1960s. As from the 1980s, policies were implemented to assist the installation of farmers (financial aid in particular) to ward off the new risk to food security. Today, one farmer in three who installs themselves in the countryside does not have roots in the farming community. In ten years time, this ratio could be one out of two.

Moreover, very recent works by the INRAE (French National Institute of Agronomic Research and Environment) have shown that, contrary to belief, agricultural regions could sometimes host more biodiversity than strictly protected regions. Arable land serves as a

habitat for almost 80% of the biomass, and they feed aquifers and filter carbon. Shouldn't we therefore change practices in certain regions and educate their populations rather than exclude them systematically?

MAINTAINING BALANCE BETWEEN ECOSYSTEMS

The danger in China could come from a **crisis of biodiversity**, **no longer due to the disappearance of ecosystems due to the absence of diversity**. Do reforestation campaigns favour biodiversity, in addition to consolidating soil? Monoculture must be avoided and a balance found between forests, prairies and farmland. This supposes knowledge, gained from sharing data, and knowhow gained from training.

In conclusion

2020 will be a crucial year for the planet's future, with the demand that governments make a two-fold commitment for biodiversity (COP15 at Kunming) and the climate (COP26 at Glasgow). IFGR intends to be active and make the voice of rivers heard, as they are too often forgotten in international negotiations despite their importance in the contribution to combating climate change and maintaining biodiversity. It will do so by communicating its solutions, its multidisciplinary approach, which alone are capable of unravelling the complexity of our current challenges, and the wealth of its international scope, since we share the same planet and destiny.

If we only care for part of the planet and we transfer our scourges elsewhere, if we care for the environment locally while allowing the situation to worsen in other places, we can only be subjected to a flow of negative reactions. Indeed, we are Geonauts, that's to say we share one and the same vessel.

ERIK ORSENNA

From the Yellow River, we have understood the huge challenge that life demands: **partnership**.

• PARTNERSHIP BETWEEN HUMANKIND AND NATURE

Biodiversity means the biodiversity of all living things, including human beings. Biodiversity must not be limited to only protecting species but also englobe the dynamics of the relationship between human beings and nature.

• PARTNERSHIP BETWEEN COUNTRIES TO WRITE A COMMON NARRATIVE

Cooperation must be forged at the international level so that China and other countries do not repeat the mistakes made elsewhere and so that the nuisances confined to one country are not exported beyond it, as in the case of plastic.

• PARTNERSHIP BETWEEN FIELDS OF KNOWLEDGE

Environmental data must be crossed with societal, historic, geopolitical and geographic data, among others, to ensure the success of transitions. It appears necessary to bring together data, experiments and evaluations among countries to build together the knowledge required for transitions.

Composition of the Rivers Committee

Ricardo Javier

Vice-President of the Argentinian subsidiary of the Ibero-American Institute of Maritime Law (IIDM) and coordinator of Hidrovias Latin America.

Pascal Bourdeaux

Historian, Associate Professo of the École Pratique des Hautes Études (Religions of Southeast Asia).

Corinne Castel

Archaeologist, Director of Research at the CNRS, Director of the French-Syrian Archaeological Mission of Al- Rawda, seconded to the laboratory "Archéorient. Environnement et sociétés de l'Orient ancient" of the Maison de l'Orient et de la Méditerranée (MOM).

Julien Clément

Daniel Dagenais

Vice-President of Operations of the Montreal Port Administration.

Katherine Daniell

PhD and researcher at the Australian National University; member of the Australian National Committee of Water Engineering; specialist on water governance and participatory processes.

Thierry Guimbaud

Managing Director of Voies Navigables de France (VNF); represented by **Nicolas Bour** for this 9th session.

Bernd Gundermann

Architect, founder of and Director of Urbia-Group – Think Beyond.

Mirdad Kazanji

Director of the Pasteur Institute of French Guyana

Kabiné Komara

International consultant, member of the Internationa Action Council.

Commodore M. Mahbub-ul-Islam

President of the Bangladesl Inland Water Transport Authority (BIWTA).

Sergio Makrakis

Associate Professor and researcher at the State University of Western Parana Unioeste (Brazil); specialist on the evaluation of the impacts of fish passes on populations of migrating fish.

Ghislain de Marsily

Emeritus Professor at Sorbonne University (Paris VI-Pierre-et-Marie-Curie) and at the École des Mines de Paris, member of the Academy of Sciences.

Gilles Mulhauser

Managing Director of wate for the State of Geneva, Switzerland.

Tamsir Ndiaye

Managing Director of the Société de Gestion de l'Énergie de Manantali -SOGEM (Mali).

Erik Orsenna

Economist, author, member of the French Academy, and specialist on sustainable development, the environment, agriculture and emerging economies.

Irina Ribarova

Professor at the UACEG (University of Architecture, Civil Engineering and Geodesics, Sofia, Bulgaria), expert on the integrated management of water resources and the circular economy relating to water.

Dr Papa Abdoulaye Seck

Senegalese Ambassador to FAO and in Italy, former Minister of Agriculture and Rural Facilities of Senegal.

Hamed Diane Semega

High Commissioner of the Senegal River Development Organisation – OMVS.

Alfredo Sese

Technical Secretary of Transport Infrastructure at the Rosario Stock Exchange -BCR (Argentina).

James Spalding Hellmers

Advisor to the CEO at the Financiera El Comercio, Former Managing Director of Itaipu Binacional (Paraguay).

Yangbo Sun

Division Director of International Cooperation of the Yellow River Conservatior Commission, Ministry of Water Resources, China.

Anne-Claire Vial

President of the Institu du Végétal – ARVALIS.

An event co-organised with



In partnership with



Founding partner



