



INITIATIVES POUR L'AVENIR
DES GRANDS FLEUVES
INITIATIVES FOR THE FUTURE
OF GREAT RIVERS



THE YELLOW RIVER

CONTROLLING THE DRAGON

MADE IN
CHINA

THE YELLOW RIVER, CONTROLLING THE DRAGON

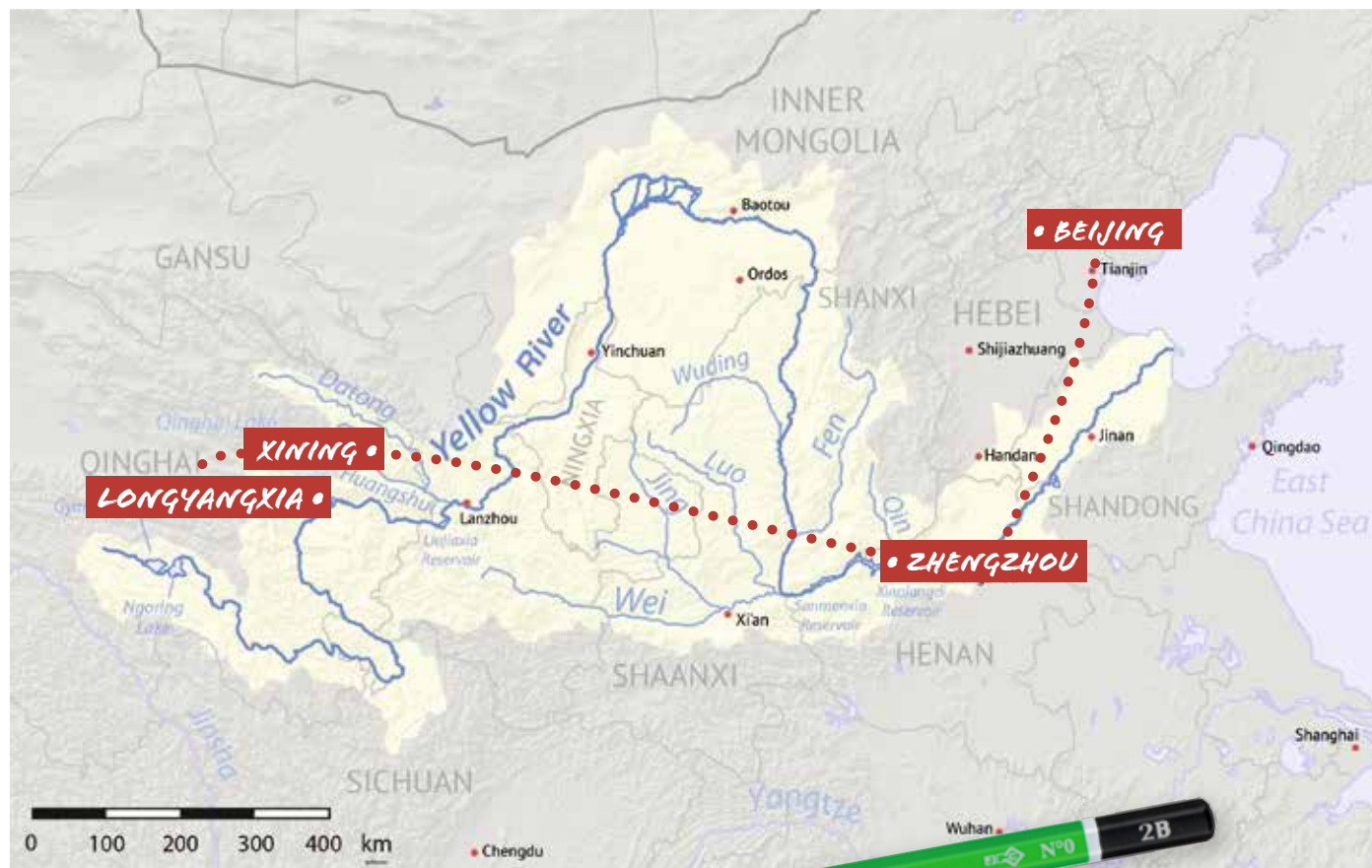


China is a giant horse, a galloping horse.

Or, if you prefer, a train, a human beast carried away in a mad race.

You come every year but every time you come it has completely changed. And the rhythm is speeding up. It has no choice. How can so many people be fed, to make sure they don't moan? How can they be given what they clamour for, a "Western" way of life, to prevent them from revolting? How can the country be developed fast enough before it gets "old"? How can the middle class be expanded by twenty million candidates every year? How can this madcap growth be maintained without destroying nature? How can one breathe in China, where the air is increasingly polluted? The 13th five year plan includes respect for the environment as one of its top priorities. This is why China plays a key role in making progress at the World Climate Conferences (notably the COP21 in Paris and the COP22 in Marrakech), with the combat against climate change.

ROUTE PLAN



It is in this context of general tension that the worrying issue of water must be raised. In brief, China lacks this essential resource: it has only 6% of all the available water on the planet for 20% of the world's population. Also, this water is poorly distributed: 20% of it flows in the north of the country, where 42% of its inhabitants live. In other words, a Chinese person living in the south has $3,352\text{m}^3$ of water per year, whereas their compatriot in the north must make do with only $1,127\text{m}^3$.

China has always been a people of engineers. An engineer always has a technical solution in their bag: one simply has to transport the water of the south to the north, that's to say the waters of the Blue River, the Yangtze Kiang. Works are in progress. Plans even exist to dig a tunnel to convey this precious resource under the Yellow River. Besides the staggering cost – (more than forty billion euros) of these diversions; besides the massive need for energy to permanently pump millions of cubic meters, there are some who think silently – the right way to think here –

that this extreme violence done to nature (and to the hundreds of thousands of people that have to be displaced) will fail to solve the problem and risk creating others: the aquifers of the south are starting to dry up. Another question comes to mind, which I will keep to myself: how long will the people of the south accept their water being “stolen” from them by arrogant northerners? China is a volcano, and it has been torn apart in the past by revolts, not to speak of genuine civil wars.

Monday, 16 January 2017.

At the end of the afternoon, we discover the new Beijing Station (gigantic but nonetheless encumbered by a crowd unimaginable to Europeans). We install ourselves in the new, magnificent blue and white Chinese high speed train. Three hours later, we arrive at Zhengzhou, a new station, also magnificent and, of course, enormous. I dare a question : Haven't you made things too big? I am answered with a wide smile that, since my last visit, the city's population has largely exceeded ten million.



*The brand new Chinese high speed
ready to take on gigantic stations.*

Whatever the case, from the standpoint of breathing, we haven't gained anything by coming here, where the pollution has recently been worse than in Beijing. According to the very serious Air Quality Index which measures the exposure of populations to fine particles, the level that evening had reached 350 ppm (the effects on health are

considered very serious above 300 ppm, the highest level). However, we're some way off the records measured in Harbin and Peking, which have reached the threshold of 600 ppm over the past few months.

Later, in our hotel, we will discover small oxygen bottles... just in case!

We must forget our ENT irritations! Tomorrow, we have an appointment with the Yellow River Conservancy Commission, YRCC for the intimate. As its name suggests, it manages this great river. But a part of its name, "conservancy", is food for thought!

Before leaving, we humbly presented Initiatives for the Future of Great Rivers to the supervisory body: the all-powerful Ministry of Water Resources, where the three principles of Chinese policy were reiterated : that of having a precise vision of the total volume of water resources, that of ensuring that it is used with all the requisite efficiency, and lastly, that of managing all forms of pollution. Then there is the need to set up, with double-checking, a precise audit of every drop of water used, and the efficient control of the use made of it.

The major novelty of 2017 consisted in installing the governor of the river's water, the "Master of the River", a role fulfilled by the highest administrative dignitary of the Province. At the end of the interview, the deputy managing director thanked us for taking such keen interest in the future of great rivers.

And now, after a short night and a long official welcome, here is the person for whom we have come, the Yellow River in all its majesty, 5 464 kilometres, along with all its tributaries : a basin covering 752,443 km², one and a half times the size of France. This is where China was born, 5,000 years ago. Just as Egypt is a gift of the Nile, China is the daughter of the Yellow River, which, according to our hosts, is nothing less than the cradle of Asian civilisation. So here it meanders before us, but there is above all a huge wall, maybe thirty metres long, and ten high. A model, like those so prized in China : a vertical and living synoptic panel ; a synoptic panel that will simultaneously act as a dashboard, since it provides an impressive amount of information.

Zhengzhou, where pollution rates have peaked.



First, the course of the river is coloured, with each colour giving information on the quality of the water. There are six possible colours: from blue (everything's fine) to red (warning) passing via green, yellow, orange and pink. Pollution data are collected every month, except during difficult periods when the frequency may be shortened to one week.

The river's discharges represent the second category of data. They are monitored in real-time, and at countless points. It's impressive to see the dials of this legendary river turn and worrying to hear our friends tell us of its decline. The river hasn't been navigable for more than 40 years. The cycles remain, with good and bad years, the high waters of summer and the low flows of winter. But the trend is falling : up to 1960, sixty billion cubic metres whatever the year, but this figure has fallen to forty-five. What is more, our hosts tell us quite frankly (and bravely), that less blame should be pointed at the sky (climate change) and more at us human beings. We have gone too far with deforestation, and thus favoured runoff to the detriment of infiltration. Fortunately,

the wisdom of our government led it to order the replanting of trees on a scale unknown in any other country in the world. Then there are the ever-expanding cities that cover the ground with asphalt. Here again, the government has increasingly issued instructions to henceforth build "sponge cities", cities that conserve water. Alas, it is hardly heeded such is the urgency to build: there are so very many people to house.

These explanations allow better understanding of the crucial importance of reservoirs, this series of small circles that indicate their rate of filling, and the painstaking monitoring of their flows, one from the other, always in real-time. There are 195 of these reservoirs, most of them enormous. These colossal works have at last tamed the "sorrow of China", the name long given to the river, so deadly is it. Sometimes due to the overflow of its waters, as during regular but always fatal floods, without reaching the sad record of 1855, when it claimed 500,000 victims; sometimes due to the weakness of its discharge, with the ensuing drought leading to terrible famines. Another advantage of the reservoirs: the river has ceased to wander,



The Yellow River under control.

meaning to say that it no longer changes its bed, as before. It remains well-behaved in its own. The main reservoirs are filmed continuously. They are much too precious to neglect, even for a second. Their images add a nautical slant to the overall panel.

Still on the subject of this vertical synoptic panel, let's now look at all these arrows, at all these small squares that punctuate the river. They are the main water intakes that allow the eight regions crossed to produce a large share of the food consumed by the Chinese people.

Although no one contests its necessity, agriculture is greedy. 80% of the withdrawals are for irrigation. The legitimacy of other uses, also increasing, is not inconsiderable: industry, drinking water for cities and so forth. How can an increasingly rare resource be shared?

It's up to the YRCC to distribute the withdrawal rights between the regions while it is the authorities of the latter that then assign the authorisations received.

The YRCC never slackens its control: the next development will concern the very precise and continuous measurement of withdrawals made by sites covering over 500 ha. The drought, far too severe in the north, does not allow for any soft options!

I had not taken into account the practical realities of this major responsibility weighing on the shoulders of the Conservation Commission. The more I hear my hosts' detailed and realistic

explanations, the more my admiration for them grows. I realise the magnitude of the resources implemented, which cover every discipline from the most exacting hydrological analyses to the massive production of concrete, from the science of networks to the management of competences in severe conditions. I also understand the astuteness they must exercise in their relations with the political authorities, with the obligation to constantly remind them of the latest and not always pleasant news of reality.

Xining, a "village" of towers.



These daily managers of water unquestionably deserve our respect, and our gratitude.

Water is a good example of reciprocal relations. We are humbled by the very quantity needed, with its overflows and its scarcity.

However, the humility it demands from us does not prevent us from gently but firmly expressing our needs.

This time we are heading west, over the clouds some two thousand kilometres distant to the new airport, with its new XXL size : a kind of Heathrow. Let's be frank, there is nothing attractive at first sight of very small city of Xining (one and half million inhabitants, nearly a village when considered on the scale of the country). Towers succeed towers, of which half are in the process of construction to accommodate an ever-growing population drawn by (or displaced by official order) jobs in factories (mainly in the photovoltaic sector)

and the mines (rare earths). And there's nothing to complete the décor except for the over-large boulevards between the towers. Then there's the altitude (2,300 metres) which hardly adds

to personal comfort. Fortunately, our hotel manager is watching over us.

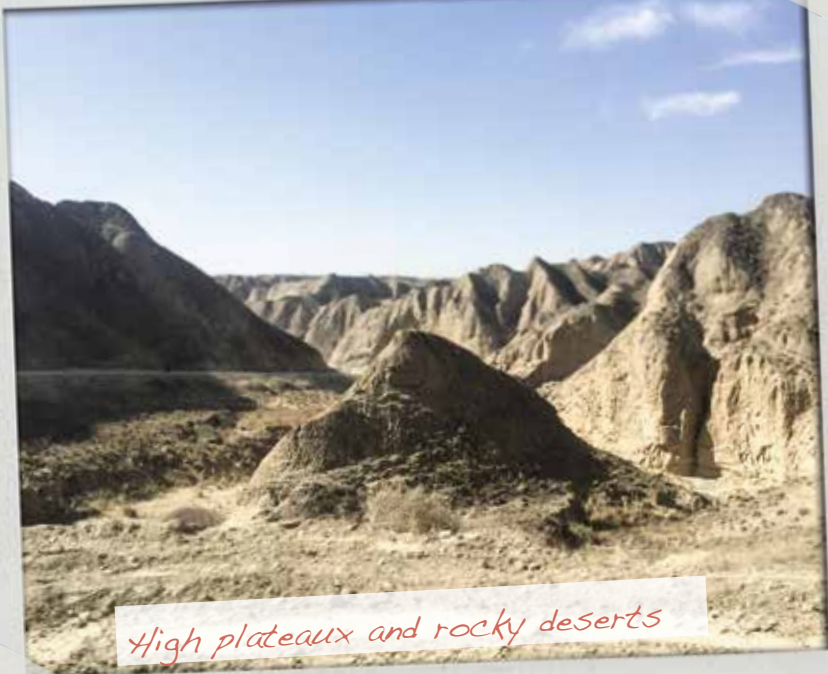
As soon as we arrive, he gives us a present of small phials whose contents he recommends we should inhale every three hours. Don't you know *Rhodiola* plant ? Well, it's normal. It grows only here, on the high plateau. You see, it's an antidote against all the ills of the mountain.

There's nothing like traditional medicine to relieve the distress of modernity ! Above all, take a stroll outside the city. The landscapes

are among the most beautiful in China. That's why tourists throng here when the hot season arrives.

Shall I book a room for you for next spring?





High plateaux and rocky deserts



The road to the dam of Longyangxia, literally the “the gorges of the sheep and the dragon”, will not allow us to verify the truth of what he said. The remarkable sites are elsewhere. We’re told we would be wonderstruck by a salt lake, a very old Lama temple, and lakes. We cross only high plateaux, rocky and barren deserts, surrounded by equally barren mountains.

Snow is scarce despite us being at an altitude of almost 3,000 metres. The air is too dry. A kingdom of wind greets us first. From time to time, a town appears: about twenty towers all similar and built recently. Such is the image of Gong He, a new town intended to settle the west. The choice of living there demands reflection. The desert starts again. With a surface area



*The endless grey-blue
expanse of the Longyangxia
solar power plant.*

of 700,000 square kilometres, the province of Qinghai has a population of just over five million people. An endless grey-blue sea appears after three hours travel but the mirage disappears when drawing close to it. This sea is in fact composed of the panels of the largest solar power plant in the world. It already covers 124 square kilometres. An extension to 200 km²

is planned. Admittedly, this site is blessed for this mode of energy: altitude, clear sky, and almost constant sunshine.

Dust is the only enemy, dust which comes in a storm and which likes nothing better than to pile up on the panels. Perhaps it's because they share the same nature, it and them: sand and silicon, silicon being the raw material of the panels.



The catalogue of the possible

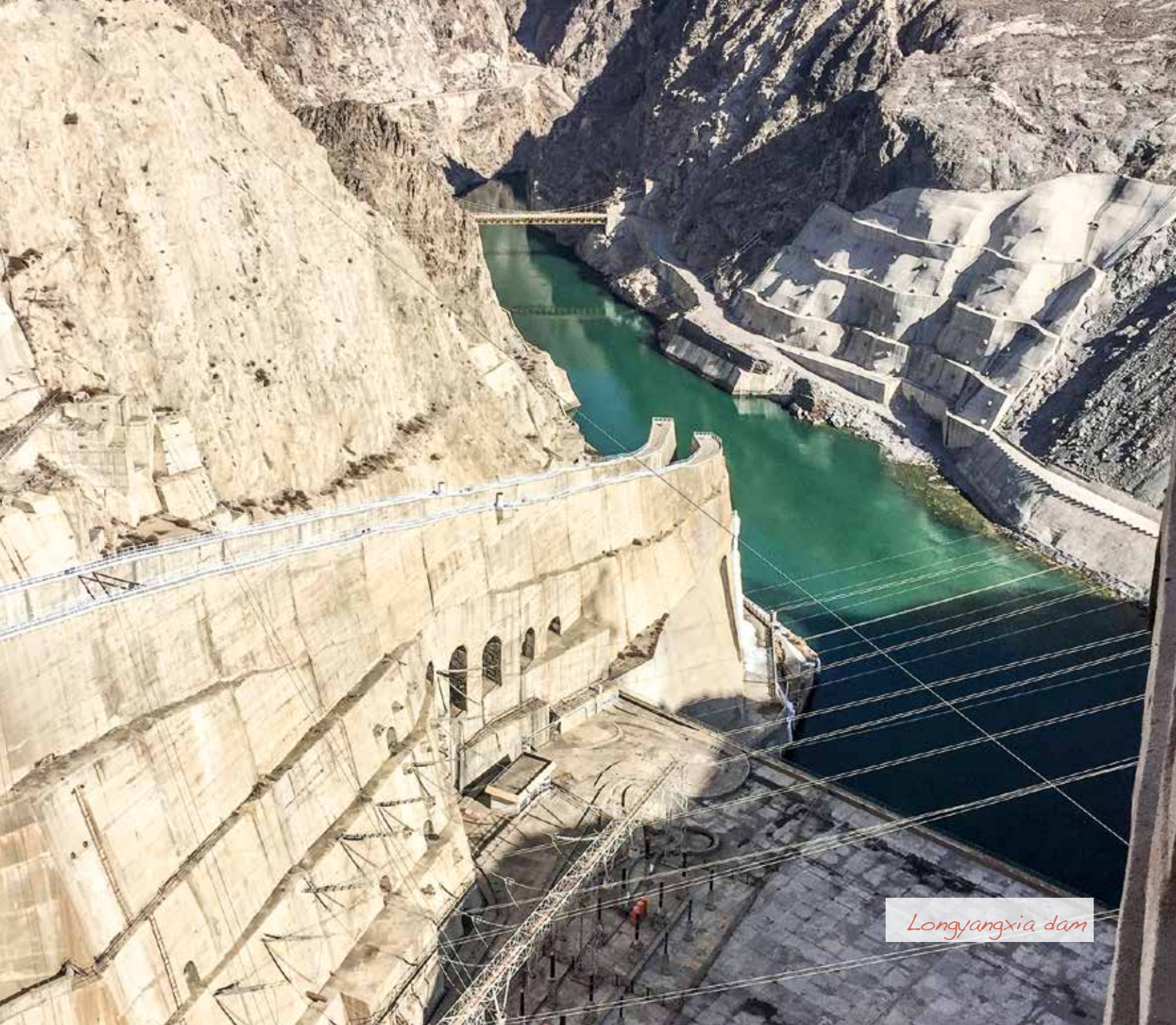
These secret affinities require constant cleaning. Small silhouettes are hard at the task, admired by yacks, the only other presence in this temple of the sun. This host of panels protects against the gusts. Small plants grow at their bases. Above all grass, a boon for the Tibetan ruminants, used to less lush meals. But there are also legumes and medicinal plants.

Modest though welcome, farming is developing in what was a totally sterile environment. But we mustn't forget the main object. This technical-bucolic farm represents an installed capacity of 1,700 MW (soon 4,000). By way of comparison, the most powerful solar power plant in France (and Europe) at Cestas near Bordeaux, only supplies 300 MW. But this space with somewhat dissimilar surfaces seems strange. The manager has us visit his catalogue : he has brought together all the panels available on the world market and he's testing them without second thought.

A typically Chinese experimental site !

This Chinese plant was worth the long journey, especially since another of its novel characteristics is that it is linked to a dam, and not the smallest, built just below. Its four turbines generate 6 TWh/year.

The plant and the dam are considered as belonging to the same unit. The electricity injected into the grid comes from both water and sun, the former taking the place of the latter when clouds cover the sky.



Longyangxia dam



The gleaming machine room.

For good measure, another mode, wind energy, is included in the 13th and 14th plans. One can trust the Chinese to break new records. The project forecasts an installed capacity – water, wind, sun – of 10,000 MW. The basin of the Yellow River is expected to supply 4.5 TWh from solar and wind

energy and 30 TWh from hydropower. To complete the image of this site remarkable for its ambition and consistency, making it the capital of renewable energies, it is noteworthy that the dam also forms a reservoir with a capacity of 25 billion m³ covering an area of 383 km². The words of our hosts at the YRCC



"We will support the IFGR at the People's National Assembly".

should be borne in mind: these reservoirs, of which this is the largest, have made it possible to eliminate the millennial scourge of flooding. Although these projects have by no means cured all its ills, or answered every need, the Yellow River is no longer the "sorrow of China". For all that, vigilance is the byword,

as pointed out by Mr Chen Zhu, Vice-President of the Permanent Committee of the People's National Assembly: more and more often the river almost disappears at its mouth in winter. Traditional Chinese wisdom comes in the form of the advice and foresight of a major figure (a once barefoot doctor), who had gone to France to study haematology and molecular biology, worked with leading researchers such as Professors Jean Bernard and Laurent Degos, and received the INSERM international prize in 2006 for his breakthroughs in treating the most malignant forms of leukaemia! "We have much to learn from your initiatives for the Future of Great Rivers and will therefore push the government to join you". Fine encouragement! A few weeks later, the number 2 of the YRCC confirmed its participation.

Thank you Mr Chen Zhu!

ERIK ORSENNA

Erik Orsenna is an expert in sustainable development as well as being an economist and writer, and the author of a reference book on the future of water. He is a member of the prestigious French Academy. For more than fifteen years, the journeys that have taken him round the world have fuelled his essays on the hidden rationales of globalisation and the management of natural resources.

THE COMPAGNIE NATIONALE DU RHONE

Since 1934, when it was entrusted with the concession of the River Rhone, CNR has cultivated a love and respect for the river. Our concession, practically the only one of its kind in the world, combines three major uses of water: electricity production, navigation and irrigation. The strength of our experience in these three domains and our belief that rivers have a role to play in today's societies have led us to launch "Initiatives for the Future of Great Rivers". Since rivers are meeting places, we feel it is important to get them to dialogue with each other so that experts can draw from each other's experiences and that, together, we can imagine the place of the river in tomorrow's world!



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AN INITIATIVE BY



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