



NGP Gansu study tour
7th – 12th May 2017

Think piece:
A study tour
with a difference

Mike May & Ilya Pittel, FuturaGene

Droughts, Deserts and Desertification – the forgotten Rio Convention

In 1992, world leaders gathered in Rio to draw up an action plan to address the biggest social and environmental challenges the world faced. Many people are aware of two of the conventions that came from that Earth Summit, on climate and biodiversity. Few know about the third: the United Nations Convention to Combat Desertification (UNCCD). Yet it is more vital than ever.

This past year, every continent on Earth faced very high water stress. Drought conditions expanded in Central Europe and western USA, and continued in Brazil, Russia, India and China. 2016 was the hottest year on record: soaring temperatures and drought led the Chinese government to implement a level-IV emergency in Gansu, where economic losses were estimated at half a billion US dollars. In some areas around the world, as much as 80% of the local water supply is actively used by businesses, farmers and residents. These stressed areas are the most vulnerable to episodic drought and crises as a result of water overuse, reduced rainfalls and poor resource management.

At the same time, public perception of the problem is poor. Acute crises and aid-based solutions distract attention from the underlying chronic problems and thwart efforts to raise political attention to long-term adaptation and mitigation solutions. In early 2017, drought-induced famine in the Horn of Africa hit the news headlines. But this disaster in fact

represents only a tiny fraction of the daily hardships that people face in the extreme arid regions of the world.

Deserts are a permanent component of the Earth's land surface; more worryingly, they are growing. In China alone, the desert area covers 28% of the territory, and has increased by 55,000km² since 1975. In the late 90s, the desert was expanding by 3,500km² every year. Some 400 million people in China are affected by desert expansion, with direct economic losses estimated at US\$ 7.7 billion per year.

For several years, the World Economic Forum has identified water risks as one of the biggest threats to the world order. Their 2016 Global Risk Report identified two other, related threats: "failure to tackle climate change" and "forced mass migration". As we are all too aware, forced mass migration is a crisis affecting many desert and arid regions – one which climate change and water stress will only exacerbate.

So how can we reverse the tide of desertification? How do we establish social and environmental conditions that encourage people to stay in arid regions? How do we prepare rural economies for hotter, drier conditions in the future? And what role to plantations have to play? In May 2017, NGP is heading to Gansu province to find out.

A Silk Road for the 21st century: the Green Belt Road

Gansu province in the north of China was an important stop on the ancient Silk Road – but life here is not silky smooth. The climate is harsh, and the desert encroaches on agricultural land at an increasing rate every year. Desert expansion, land infertility and lack of water threatens the living standards of communities in Gansu.

This is one of the regions set to benefit from the One Belt One Road initiative – a multi-trillion dollar development strategy proposed by the Chinese government. This 21st century Silk Road aims to link Central Asia, the Middle East, Europe and beyond in a spirit of “peace and cooperation, openness and inclusiveness, mutual learning, and mutual benefit”.

But for this grand scheme to succeed, it will need leadership and vision, cooperation and innovation. It needs to deliver solutions to people threatened by poverty, water stress, climate change and desertification. And it needs to be ecologically resilient in the face of a changing climate.

As the Road unfurls, it will cross some of the harshest and most inhospitable regions of the world. The questions raised by the study tour and the solutions envisaged by the participants could provide valuable inputs to the high-level planning of this massive project.



New Generation Plantations: ecological infrastructure for a Green Belt Road

One Belt One Road will bring together a world of different cultures and values. The NGP concept offers system-wide, cross-sectoral planning and zoning in mosaics, designed to maximize the efficiency of production while reducing competition for land and water – an ecological infrastructure where a new generation of agriculture, industry, forestry, infrastructure and cities coexist with nature in a water-stressed economy. Well-placed and well-managed plantations provide opportunities and value for people living alongside them, opportunities to restore degraded ecosystems and build resilience, opportunities to increase the supply of renewable raw materials while sparing natural habitats and using water wisely.

Chinese efforts to combat desertification and water stress

In 1979 China initiated the 'Three-North Shelter Forest Programme', informally known as 'China's Great Green Wall'. This is a 70-year long attempt at slowing down the encroaching Gobi Desert by planting new forests. While several tree species are used, poplar has to date been the species of choice. The programme is slated to finish in 2050 and was designed to plant trees across 350,000km², spanning 4,500km. If successful, this will be the biggest planted forest programme in the world. In Inner Mongolia, the Chinese government has relocated almost half a million people because of desertification. Officials offer subsidies to families that sell off their animal herds to prevent over-grazing on the edge of the desert, which is believed to exacerbate desertification since plants don't have time to recover and the soil is left bare, leading to soil erosion.

The reduced availability of surface water in 1950s agricultural developments drove substantial abstraction of groundwater in the 1970s. Using both surface water and groundwater has led to the steady reduction of shallow groundwater and increased salinity: desert vegetation has withered, sandstorms have increased, and desertification has marched on.

In an attempt to reverse the situation, China is restricting the overuse of water on several fronts. They are restricting the use of surface water and closing thousands of wells in order to restore rivers, recharge groundwater and revive the vegetation. Government water policies include a cap on water extraction, quotas and pre-paid irrigation cards to improve water use efficiency, and objectives on improving water quality and reducing pollution. The government has also embarked on the ambitious South-to-North Water Transfer Project: by routing water pipes across thousands of kilometres, it's designed to deliver 28 billion m³ of water from the Yangtze river basin to the North China Plain by 2020.

These efforts to conserve water pose a social challenge. While closing wells and reducing grazing pressure makes sense from an ecological perspective, it risks reducing livelihood options for local people. If people can't irrigate crops or raise livestock, how will they earn an income? And if people can't earn an income, migration will increase. Is there a way to ensure interventions in desert regions are sustainable from ecological, social and economic perspectives?

A study tour with a difference

Creating solutions for global challenges requires local knowledge and local strategies. The desert regions of China have a tradition of bringing life from the dust dating back thousands of years. Local people have captured livelihoods from a range of locally adapted species and one of these, yellowhorn (*Xanthus sorbifolium*), has come to the attention of the Chinese government as a potential solution for soil stabilization and providing livelihoods under water stress. This species grows naturally in these desert climates with carbon and nutrient-poor sandy soils, and withstands the sub-freezing (-10°C) winters and hot summers. Importantly, yellowhorn produces a high content oil-seed that can be used in the food, cosmetics and biofuels industries, providing an economic offtake that gives farmers an incentive to manage the crop for the long-term.

This makes yellowhorn an ideal species for afforestation, addressing local rural economic and environmental challenges as well as for stabilizing the social infrastructure in this remote region. The State Forest Administration (SFA) Development Plan (2011-2020) recognizes this, and proposes to support planting 1.6 billion yellowhorn trees across China. This amounts to 940,000 hectares, of which 340,000 hectares are to be planted in Gansu.



Yellowhorn trees in flower. The species grows naturally in Gansu's desert climates, withstanding the harsh climatic conditions.

Indeed, FuturaGene identified yellowhorn as a good candidate for further study in the field trials it's conducted in the area since 2011 (newgenerationplantations.org/en/casestudies/27). Since 2015, FuturaGene has established a 14-hectare research, development and seedling production centre in Gansu. Conceivably, the oil-bearing seeds of this species could be used as feedstocks for a whole range of applications – from locally produced edible oil to jet fuel to ease China's massive oil deficit. But challenges stand in the way of transforming promise into practice – technical (the species is not domesticated), social (who would grow it and where) and economic (how do you create markets for a new product from nothing, how would this be financed – and what incentives can be provided to make production economically viable?).

Most NGP study tours are hosted in areas where plantations are an obvious (if sometimes contentious) choice for rural action – and most study tours ask questions about tree species which are familiar to most participants. This study tour takes the plantation thinking into a whole new biome – deserts – and takes the biological questions to a whole new level – an unknown, undomesticated wild species, with an undeveloped market. The study tour will challenge new levels of thinking on how to balance ecological solutions with social safeguards: not least, the tree species of interest (yellowhorn, as well as oil peony) are not *plantation* species, but should be regarded as *orchard* crops. This is a study tour with a difference.



One of FuturaGene's yellowhorn nursery plots in Gansu.

Questions to consider

NGP is all about bringing together different perspectives and experiences to find new solutions. A fundamental part of that is asking questions. During the course of this study tour, we'll be asking a series of questions and discussing them in groups. The main questions we'll be examining is:

How can we realize the potential of plantations to transform rural community livelihoods and stabilize land degradation in desert areas?

Growing species like yellowhorn could stop the spread of desertification, and provide incentives for farmers to stay on the land. But for this to happen successfully, on a scale that matters, requires vision, political will, innovation, investment and cooperation. How can NGP participants support governments to create the enabling environment required for businesses and investors to consider venturing into desert areas? How can we build value chains linking communities with innovators and with markets? How can we bring together plantation companies and investors, growers and government outreach agencies, processors and retailers, researchers and innovators?

Under this overarching question, we'll be exploring a number of themes, discussed on the following pages.



How can we realize the potential of plantations to transform livelihoods and stabilize land degradation in landscapes like this?

1. Socio-economic impact

How can we find the “sweet spot” for plantation development in desert areas – that stabilizes rural economies under water stress, reduces poverty, and reduces climate-induced mass migrations?

Afforestation in desert areas isn't a new idea – it's something China has been doing for many years. But many local and multilateral projects have not achieved the expected results – not least because of a lack of economic incentives for local people. How can we avoid the mistakes of the past? How do we make rural development profitable, and through this work with governments and investors to develop the infrastructure required to enable the flow of innovation?



Seedling production can provide an economic opportunity for local people.

2. Financing/investment

What local and international funding mechanisms and models could minimise business risk to support plantation ventures in desert regions?

To realize the environmental, social and economic benefits of plantations in desert areas at scale will require significant upfront finance. Given that the effects of desertification and drought are felt internationally – through sandstorms, ecological migration and agricultural market fluctuations – there is potential to mobilize international as well as local funding. But plantations in these conditions are a long-term and high-risk investment – and the financial returns are likely to be lower than in more productive regions. What would be needed to encourage investment in such high-risk areas? How can we develop and measure models for “impact investment” that go beyond pure economic return?



A peony plantation in the Gansu desert – a high-risk investment?

3. Water/environment

How can desert forestry and agriculture in remote areas be sustainably practised with limited water supplies?

Woody species can improve water retention in arid regions and reduce desertification in the long run – but growing them requires water, of course. Reduced recharge and overuse of shallow groundwater aquifers in arid regions has increased salinity, led desert vegetation to wither, and exacerbated sandstorms and desertification. So how can this problem be avoided? What local and international mechanisms can support maintaining water table levels through de-desertification efforts?



Yellowhorn seedlings in the FuturaGene nursery. How can large-scale afforestation be made viable in arid regions?

4. Incentives

What would a carbon credit system for forestry and agriculture specific to desert areas look like?

Carbon credits could be part of the business case for developing plantations in desert areas (and for afforestation projects in general). Currently, however, credits are granted for carbon sequestration in wood only – and this doesn't provide enough incentives for farmers to manage trees after they have been planted. Could carbon credits be extended to offtakes of trees (e.g. husks and shells), soil carbon enhancement (e.g. biochar, mulching) and medium- and long-term carbon sequestration in products such as activated carbon and particle board? How could this incentivize long-term ecological management in desert areas?

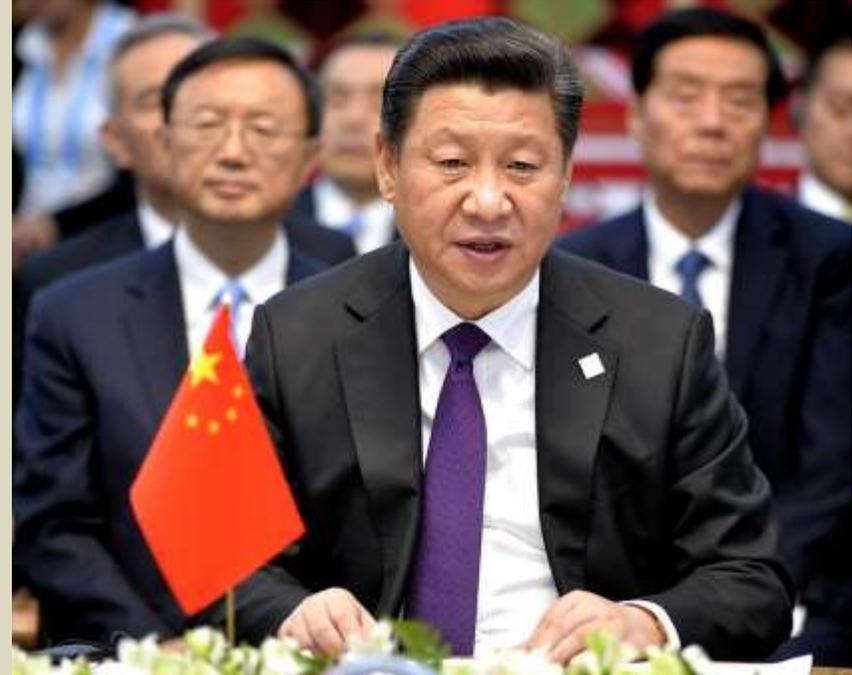


Could carbon credits be extended to cover offtakes of trees?

5. Political support

How can we take the NGP study tour findings to national leaders and local authorities in our countries, and especially in China?

As climate denial becomes institutionalized in the USA, China is stepping up to fill the political void by pledging leadership and action. At the World Economic Forum in Davos in January 2017, Chinese President Xi Jinping invited the whole world to meet in May in Beijing to brainstorm on interconnected development in the face of climate change. Could we use this study tour to prepare a statement to share at this summit, showing how plantations can contribute to climate mitigation and adaptation – particularly with reference to the One Road One Belt initiative?



President Xi has promised leadership on climate change – what can NGP contribute to these efforts?



www.newgenerationplantations.org