

THE RIO CONCHOS PROJECT

Restoring a desert lifeline



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A TALE OF TWO RIVERS

The Chihuahuan Desert region is approximately 800 miles long and 250 miles wide. It stretches from the Rio Grande Valley in southern New Mexico to the north of Mexico City and is surrounded by Mexico's two great mountain ranges – the Sierra Madre Oriental and the Sierra Madre Occidental.

Two rivers, the Rio Grande and its major tributary the Rio Conchos, provide the main source of freshwater for millions of people, and a multitude of wildlife species that make the Chihuahuan Desert the third richest desert in biodiversity, and one of the 20 most important ecoregions in the world.

The rivers are the lifeblood of the desert. The balance of life here depends on them.

Rio Grande – a river running dry

The Rio Grande (known as the Rio Bravo in Mexico) runs for 1,865 miles. Its entire basin covers 170,000 square miles – an area the size of Italy. The river rises in the San Juan Mountains of Colorado, flows south through the San Luis Valley into New Mexico, then into Texas, where it becomes an international border with Mexico. At the border town of Ojinaga the Rio Grande is fed by the Rio Conchos. It then cuts through the Chihuahuan Desert on to Big Bend National Park, and heads east to the Gulf of Mexico.

Maps still show the Rio Grande flowing through the Chihuahuan Desert and down the US/Mexican border to the Gulf of Mexico, yet in reality the river has been divided into two. Downstream of the Mexican city of Juárez, the Rio Grande dries up for 200 miles, becoming little more than a collection of seeps and pools locals call the “forgotten reach”. Even the underground springs and water holes that help keep it flowing through periods of drought, are drying up.

Rio Conchos – a river of hope

The Rio Conchos rises in the mountains of the Sierra Madre Occidental then flows northeastwards across the Chihuahuan Desert through the city of Chihuahua and the dramatic Pegüis Canyon, before reaching its confluence with the Rio Grande. Here, the replenishing waters of this vitally important river restore between 70-90% of the Rio Grande's flow.



Rio Grande, Big Bend Region. © WWF / Jennifer MONTOYA



Rio Conchos. © Edward PARKER / WWF-Canon



Mexican wolf (Canis lupus baileyi).
© PROFAUNA Manolo Ochoa



World's second largest cactus (Carnegiea gigantea, Saguaro).
© Edward PARKER / WWF-Canon



Crevice spiny lizard (Sceloporus poinsetti).
© Chris Martin BAHR / WWF-Canon



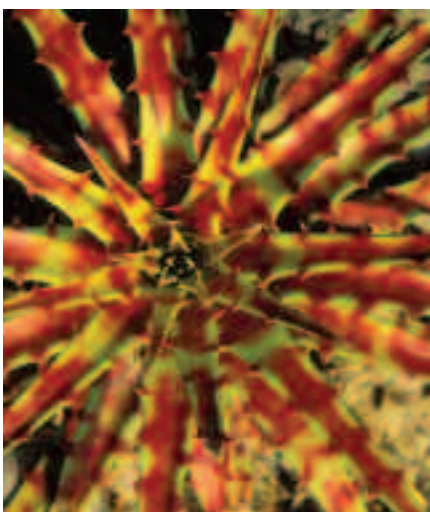
Bighorn sheep (Ovis canadensis).
© Edward PARKER / WWF-Canon



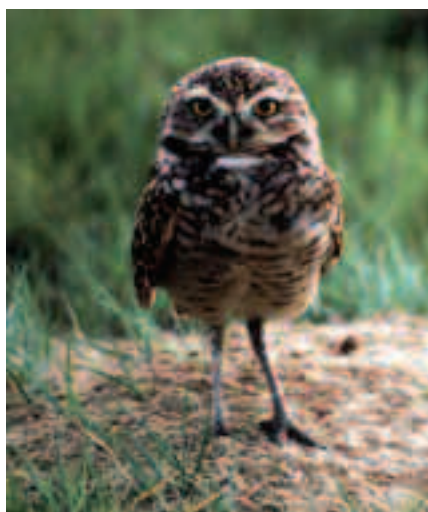
Julimes pupfish (Cyprinodon nsp Julimes).
© WWF / Juan Miguel ARTIGAS AZAS



Female Bison and calf (Bison bison).
© Fritz PÖLKLING / WWF-Canon



Cactus (unknown genus), Tehuacán Valley.
© Anthony B. RATH / WWF-Canon



Burrowing Owl (Athene cunicularia).
© Bruno PAMBOUR / WWF-Canon



Female pronghorn antelope (Antilocapra americana). © Rob OATES / WWF

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LIFE IN THE DESERT

The Big Bend region encompasses a huge sweep of the Northern Chihuahuan Desert, and supports an exceptional array of wildlife. More than 1,200 species of plants, 600 vertebrate animal species and around 3,600 insect species are found here. Mule deer, pronghorn antelope and grey fox roam the fertile river valley. Roadrunners scurry after earless lizards in the desert scrub. Golden eagles soar above the cool mountain tops.

The region is also an important haven for migratory species such as monarch butterflies. Once a year these delicate insects make the amazingly long migration from Canada to southern Mexico. During their trip they are responsible for the cross pollination of thousands of plants in this region.

Endemic species

The Chihuahuan Desert is home to almost 1,000 species found nowhere else in the world. These include butterflies, spiders, ants, lizards, snakes, fish and almost one-fifth of the world's cacti. Endemic turtles include the Bolsón desert turtle, Coahuilan box turtle and several softshell turtles.

Plants

Prickly pear, claret cup and pitaya are just some of the cactus species that add a splash of colour to the desert. Other flowering plants include the desert marigold, desert willow, bluebonnet, ocotillo and desert sage.

Mammals

The desert supports the most complete assortment of large mammals in North America. They include black bears, mountain lion, Mexican wolf, collared peccary (known locally as the javelina), bighorn sheep, black-tailed jack rabbit and kangaroo rat. The region also contains small wild populations of the highly endangered American bison and Mexican prairie dog, as well as the common prairie dog.

Reptiles

The Texas horned lizard, Texas banded gecko and several species of spiny lizard are found here. Snakes include the Trans-Pecos ratsnake, Texas black-headed snake, and several species of rattlesnake.



Mountain lion (*Puma concolor*). © KLEIN and HUBERT / WWF

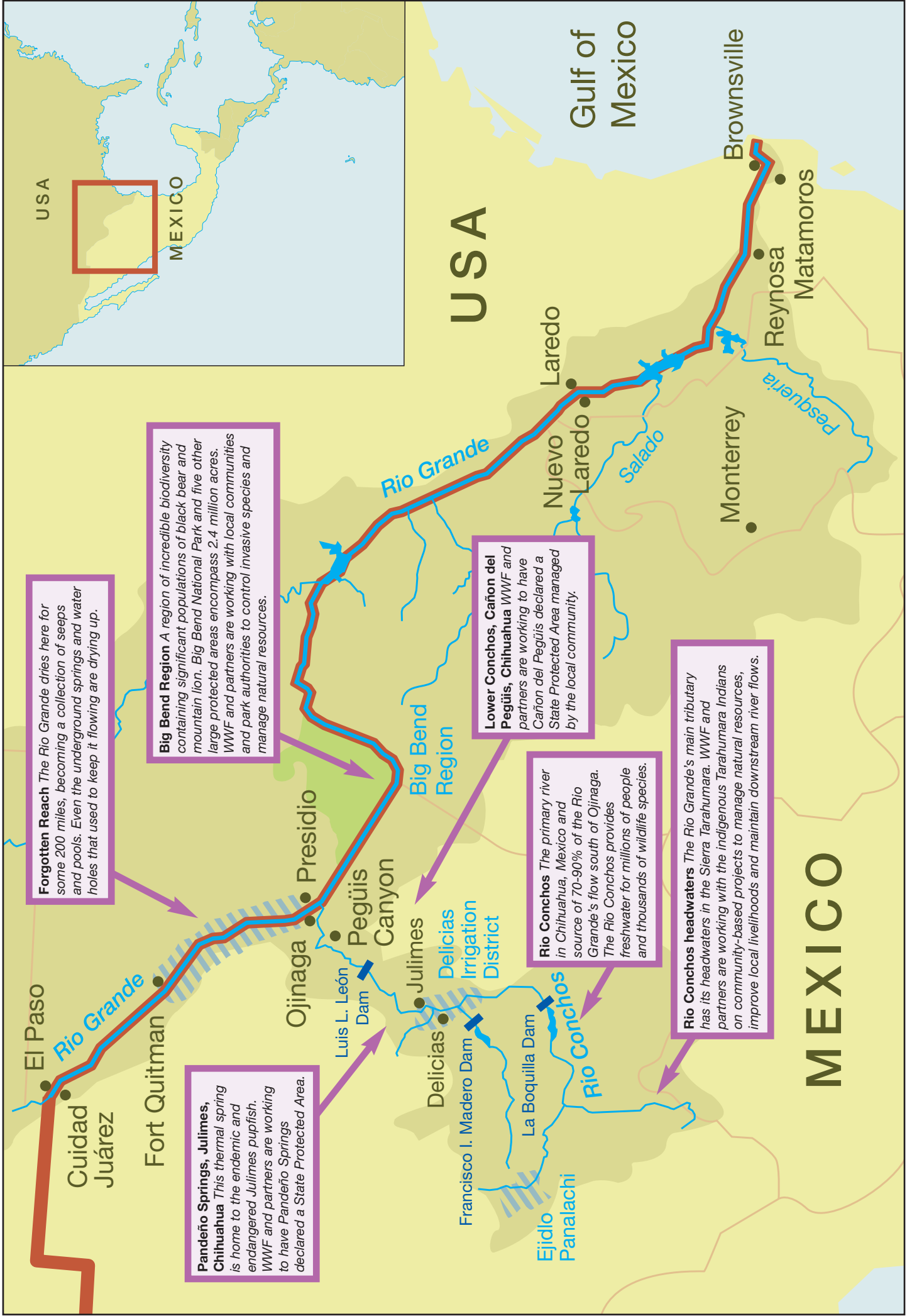
Bird species

Common bird species include the greater roadrunner, scaled quail, black-throated sparrow and cactus wren. Numerous birds of prey also inhabit the desert, such as the great horned owl, elf owl, burrowing owl, Aplomado falcon, ferruginous hawk, and the rare zone-tailed hawk.

Fish

There are 110 native species of fish, including particularly unusual ones such as the Julimes pupfish, which lives at temperatures above 104°F. Another unusual fish is the Amazon Molly, an all-female species named after the warriors of Greek mythology. In 2005, a breeding population of the Conchos trout was rediscovered in the upper tributaries of the Rio Conchos giving hope for this highly endangered native fish.

All of these incredible wildlife species have one thing in common – they depend on a perennial water source for their survival. It is vital that the Rio Grande maintains healthy instream flows to sustain riparian habitat and protect the natural ecosystem. WWF is carrying out a range of different projects to ensure this happens, so that the natural balance of life is maintained. Further details can be found from page 8 onwards.



MAN'S DESERT FOOTPRINT

Evidence of past human life can be found all over the Chihuahuan Desert. Prehistoric rock carvings, old presidios, ghost towns and ancient ruins such as the mysterious city of Paquimé are proof that people have survived here for millennia. Despite the harsh environment they have been able to create livelihoods in the desert.

Population today

Today over 10 million people live in the Rio Grande basin, and 33% of the Chihuahua State population inhabit the Rio Conchos Sub-Basin. Economic expansion is drawing more people to the area. To meet human needs for water, extensive networks of water diversions and dams control the flows in both the Rio Grande and Rio Conchos. The largest of these is La Boquilla, which provides the main water supply for the large irrigation district near the town of Delicias. The huge storage capacity of the dams is not only to supply freshwater for industry, agriculture and people. A treaty made with the US in 1944 means that tributaries of the Rio Grande, particularly the Rio Conchos, must supply water to water users living further downstream on the Rio Grande.



Ciudad Juárez and El Paso on the Mexican/USA border. Much of the water used is extracted from the Rio Grande and aquifers under the Chihuahuan desert. © Edward PARKER / WWF-Canon

A growing economy

Economic activity within the Rio Conchos basin accounts for over 40% of Chihuahua's Gross State Product and is closely linked to agriculture, mining and forestry activities. Agriculture now takes up to 90% of the Rio Grande's water. A variety of crops are produced

including maize, winter wheat, alfalfa, cotton, pecans and cash crops. This agriculture is largely dependent on the water that flows into the Rio Grande from the Rio Conchos. The Conchos itself irrigates over 220,000 acres of crops in three irrigation districts and is the main source of water for 1.3 million people in Chihuahua.

The need for water

In 2005, 692,000 acre feet of water were diverted from the middle of the river – equivalent to one Olympic-sized swimming pool every two minutes. Extraction on this scale means virtually nothing is left for nature, particularly in drought years. Much of the water stored in dams evaporates under the hot sun, or is lost en route to the farms, with only 40% of water actually reaching the crops. Even then, it is often wasted through inefficient practices such as flood irrigation.



Francisco I Madero Dam, where water saving irrigation practices have currently been put in place. © WWF /Jenny ZAPATA

RIVERS OF CHANGE

The once mighty Rio Grande is in danger of running dry. Drought, pollution and the effects of unsustainable water use are depleting its waters at an alarming rate, leaving little to sustain the ecological balance. Unless strict water conservation measures are adopted by communities along the river, the future of the Rio Grande looks bleak.

Depleted by modern day need

The health of the Rio Conchos is key to maintaining the flow of the Rio Grande. Yet this river too is under threat. Its flow fluctuates throughout the year – at times flooding, then drying to a trickle in a matter of months. A prolonged period of drought and low flows from 1994-2006 meant water available for agricultural irrigation dwindled to less than 10% of the historical annual average. Desperate farmers resorted to pumping more and more water from underground aquifers without knowing how much – or how little – remained.



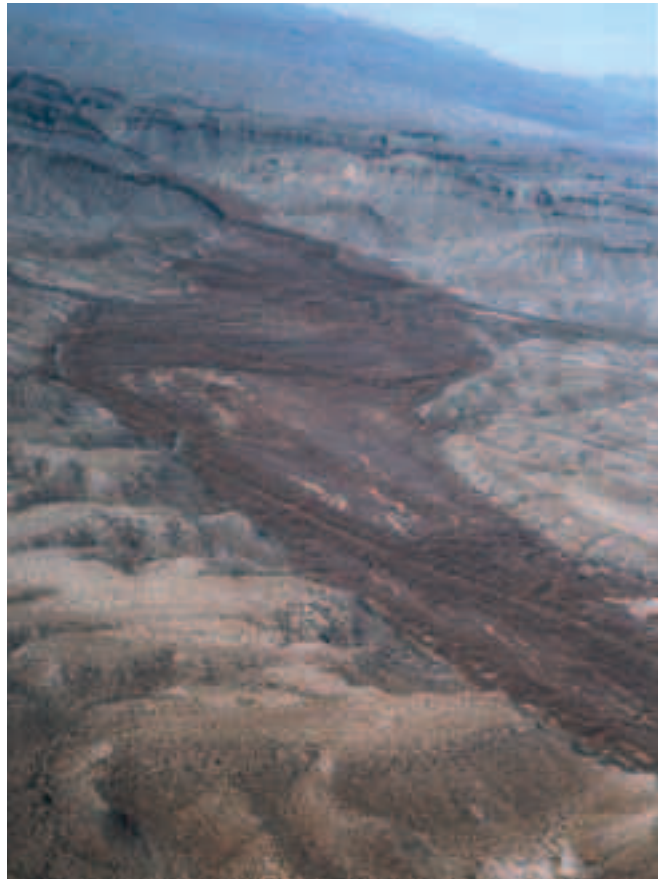
Flood irrigation of Pecan plantation. © WWF / Rob SHORE

Vulnerable to climate change

The semi-arid climate of the Chihuahuan Desert and the relatively low availability of dependable surface waters make dramatic changes in rainfall patterns (in particular another prolonged drought) a major concern. The region is considered to be among Mexico's most vulnerable ecosystems to climate change, making dramatically improved water management even more of a priority for both wildlife and people.

Destroyed by invasive species

As a result of low water levels, pollution has become more concentrated, seriously affecting the health of the river's ecosystem. The lower Rio Grande is suffering from increasing salinisation, with coastal species invading as far as 200 miles upstream. Saltcedar, an invasive plant species, is becoming more widespread and has completely choked almost 200 miles of the river corridor from downstream of El Paso to where the Rio Conchos joins the Rio Grande.



Saltcedar (*Tamarix ramosissima*) Native to Eurasia and Africa

Evergreen tree that grows to 20 feet tall. Long tap roots intercept deep water tables and interfere with natural aquatic systems. The plant monopolizes limited sources of water, disrupts the structure and stability of native plant communities and degrades wildlife habitat.

Ariel view of Saltcedar in the Forgotten Reach.
© WWF



Tipping the balance of nature

As the rivers dry, the Chihuahuan Desert's once unparalleled variety of cacti and other desert plants are gradually disappearing, as are the deer, bears and jaguars that once inhabited the region. At least a third of the region's native and endemic fish have disappeared and the dried up wetlands and lakes can no longer play host to migrating birds.

People are suffering too. Farmers are finding it harder and harder to grow their crops. In recent years, extremely harsh conditions and water scarcity have forced many growers out of business. This has wide reaching consequences not least for the thousands of Mexican workers whose income relies on crop harvesting.

When the Rio Grande ran dry

Upstream of the Big Bend region the Rio Grande runs dry for 200 miles before the Rio Conchos restores its flow. Locals call this place the Forgotten Reach. But that is not the only place the river runs to desert. In the summer of 2001, a 320 ft. wide sandbar completely blocked off the Rio Grande from the Gulf of Mexico. The sandbar was subsequently dredged, but it re-formed almost immediately and lasted for five months before summer flows washed it away. For much of the next two years the sandbank returned, literally turning the river into desert.

Dry Rio Grande near the Forgotten Reach.
© WWF / Rob OATES



RESTORING A DESERT LIFELINE

The pressures facing both the Rio Grande and the Rio Conchos are numerous and complex, yet despite the threats there is still hope.

Since 2002, WWF-UK has been working with Mexico to monitor and protect the health of the Rio Conchos. Our aim is to establish sustainable ways of managing water resources here to ensure vital year-round flows continue to reach people and wildlife in the wider Rio Grande basin.

Our work so far

High in the Sierra Tarahumara, source of the Rio Conchos, we are working with indigenous communities to establish protected areas, implement community-based problem solving workshops and processes. We have also funded local water conservation projects.

Further downstream we are assessing a payment scheme that can help water users fund better upstream water management to protect their supplies. Along the mainstream of the river we are working with commercial agriculture producers to develop water conservation techniques for cotton, pecan and alfalfa production.

At political level we are focussing on creating institutions and legal mechanisms, as well as identifying sources of funding to acquire water saved in



Distributing communication materials in the Sierra Tarahumara.
© WWF / Citlali CORTES

agriculture. This will be used for environmental purposes, such as protecting wetlands and securing in-stream flow, to ensure the health of the river and maintain a sound ecological environment. In addition, we are working with local people to eradicate the invasive Saltcedar tree that has proliferated through large areas of the Big Bend region. We have already restored floodplain habitat that had become infested with this species.

The mayor of Ojinaga during the multi-stakeholder meeting to review the Rio Conchos IRBM strategy in 2007. © WWF / Jenny ZAPATA



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The following outlines of some of our key projects and our aims for the future:

Irrigation improvements in the Delicias district

WWF has been working with farmers and the government in Delicias to develop sustainable water management practices. Traditionally, farmers have irrigated their fields by flooding them with vast quantities of water. By using high pressure sprinklers and drip irrigation, water is applied evenly and in lower volumes. Results so far show a 60% saving in water levels and an increase in production levels of up to 50%.

We need to continue to build on the success of our work in Delicias and expand our work into other regions, to help farmers improve their irrigation methods and use water more efficiently.

NB: See appendix 1 – water conservation in the Delicias Irrigation District



Farmers from the Delicias irrigation district during a research consultation. © WWF / Jenny ZAPATA

Introducing a water bill in Mexico

To lay a firm foundation for improving water management in Mexico, WWF is lobbying for reforms to the 1992 Mexican water law. These include integrating water resource management across areas such as forestry, increased water-use efficiency, and ensuring public participation in water management decisions.

Achieving these reforms will ensure that future planning decisions respect the needs of the environment. This will open up many exciting possibilities to improve river basin and water management throughout Mexico.

Analysing the 1944 water treaty

WWF is analysing the 1944 treaty which controls the use of water from the Rio Grande. We are identifying federal roles and opportunities to ensure that the ecosystem of the Big Bend region receives optimum quality, quantity and distribution of water. A white paper will be written outlining possible solutions such as dam re-operation, the creation of water trusts and other policy initiatives.

Securing environmental flow to the Big Bend region is of vital importance to the indigenous communities and wildlife it sustains.



Leaders of the Irrigation District Producers' Association meeting with WWF. © WWF / Jenny ZAPATA

Creating a River Basin Organisation

The Inter-Institutional Work Group comprises people from all over the Rio Conchos basin who work together with the government on water management and land use. WWF is working to support the group and build them into a fully functioning River Basin Organisation.

We need to develop a legal strategy to reactivate the Rio Conchos Basin Committee and include water security goals.

Restoring Natural Protected Areas at Pegüis Canyon and Pandeño Springs

Pegüis Canyon resembles a small Grand Canyon and is one of the most dramatic yet relatively undiscovered sites in the region. Pandeño Springs are hot springs near Julimes, home to the endemic Julimes pupfish, thought to be the hottest freshwater fish in the world. Working with local people, WWF has helped initiate community protection and ecotourism schemes in these areas.

We need to continue our work to ensure Pegüis Canyon and Pandeño Springs become formally recognised as a Natural Protected Areas. This will attract more tourists to the region and provide local communities with a sustainable, alternative income.

Conchos trout conservation project

This project aims to save the recently rediscovered and critically endangered Conchos trout from extinction. The first phase aims to ensure the viability of the breeding population found recently in the upper tributary of the Rio Conchos and to implement a management plan for the conservation of the species.

See appendix 1 for further details about this project.

Assessing the health of the ecosystem

WWF is monitoring the health of the freshwater ecosystem throughout the Rio Conchos basin by studying hydrodynamics, water quality, and biotic conditions including changes in fish assemblages and macro-invertebrate communities. Results are stored on the Rio Conchos website.

The website holds all the data collected on land and water use and is a valuable information resource for water users.

Hydrological monitoring

WWF is currently developing and fine-tuning water management models for the Rio Conchos. By overlaying different development scenarios, such as new industry or climate change, we can investigate the impact on water flows and use the results to influence authorities in their decision making.

By actively demonstrating the impacts of industry and other pressures on water flows, we can positively influence planning decisions.

Reducing the impact of Saltcedar

WWF is training local communities in the management of this highly invasive species.

We are also monitoring the effects of the Saltcedar Leaf Beetle, which was introduced as a natural biological control.

We need to continue our monitoring in order to gain an understanding of the beetle's impact on vegetation, river channel, and other species.

Soil conservation and restoration work

WWF has been working with local communities to restore land that has been lost through soil erosion by building gabion dams – rock structures built into heavily eroded river channels. These dams trap sediment and gradually restore the land to its original state, replacing land for local farmers and improving the quality of in-stream habitats. One local community appreciated WWF's help so much they named their dam after us!

Improving the lives of people and wildlife

An important factor in the success of our pilot projects is our work with local communities to help them control invasive species, replant native vegetation and increase water flows. This has not only helped ensure people get the water they need. Just as importantly, it has also restored a more natural river channel and floodplain habitat which supports a rich variety of wildlife – from flowering plants that attract bees and butterflies, to fish that use the floodplains for breeding and nursery areas, and the large mammal populations that depend on a year-round supply of water to survive.

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Gabion dam, named after WWF.
© WWF / Jenny ZAPATA



New drip irrigation system in Delicias Irrigation District.
© WWF / Rob OATES



Gabion dam in eroded stream channel.
© WWF / Jenny ZAPATA



Applying herbicide to Saltcedar.
© Joe SIROTKAK



Community rainwater collection system.
© WWF / David Lauer READ



*Grey fox (*Urocyon cinereoargenteus*).*
© Anthony B. RATH / WWF-CANON

GOING FORWARD

The successes we have achieved so far are heartening. Our close partnership with Mexico's National Water Commission (CONAGUA) means the conclusions of our work in the Conchos basin with local communities and at policy-making level, will be fed directly into the review and updating of national legislation.

By getting environmental considerations built into water management systems we can help ensure the ecosystem receives the quality, quantity and distribution of water it needs to flourish. The pilot projects we have carried out so far show that clearing invasive species, replanting native vegetation and increasing water flows helps restore a natural river channel and floodplain habitat, which creates a biodiverse ecosystem. We need to build on this success and repopulate wider areas of the basin with natural vegetation.

A window of opportunity

The time is right for change. During September 2008 Chihuahua experienced unusually high rainfall, which resulted in the flooding of several agricultural and urban areas and was exacerbated by poor management of water storage facilities. This highlighted the importance of implementing a revised river management approach that is in concordance with environmental flows, and uses sound information to set patterns of storage and release of water. Previous to this flooding, two years of good rainfall

meant that water was not in short supply and people were willing to come to the table to discuss resource allocation. After several years of work, WWF now has the data to ensure the correct decisions can be made and the most effective solutions put into place. We must not let this opportunity go by.

A project of global relevance

Our work is not just relevant to Mexico. By demonstrating effective solutions in the Rio Conchos, WWF can not only fundamentally change the way water is managed here, we can help inform and develop water management practices globally, and improve the lives of people and wildlife all over the world.

It is vital that we continue

The challenges facing the Rio Grande are complex, but we are making significant progress. Now we must keep pushing forward to increase the momentum we have built at both community and government and ensure real and sustained change takes place. This level of commitment will take time and money and we urgently need to raise £245,000 in order to continue our work.

NB: The money raised will be used in many ways, from establishing National Protected Areas, to installing wastewater treatment facilities in small town and villages. See Appendix 2 for further information on how the money raised will be used.

The middle Río Conchos, just upstream from La Boquilla dam. © WWF / Néida BARAJAS



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APPENDIX 1

Water Conservation in the Delicias Irrigation District



© WWF / Jenny ZAPATA

Farmers in the Chihuahuan Desert region of Northern Mexico have been working with WWF and the local water authorities to improve their irrigation systems. They are now seeing positive results in both water savings and increased productivity.

Mauricio De La Maza, WWF-Mexico's Chihuahuan Desert Director, explained how lining irrigation channels with concrete, channelling water in pipes and improving irrigation techniques has helped farmers save water. Previous irrigation methods meant much of the water evaporated or soaked into the earth before it reached the crops.

De La Maza explains: "Traditionally, farmers flooded their fields, so much of the water was lost. Now they have installed high-pressure sprinklers and drip irrigation to water alfalfa, cash crops and pecan tree plantations. This allows water to be applied more evenly and in lower volumes. In the case of pecan plantations, water use efficiency has improved by 90 per cent."

A wide variety of techniques have been introduced to save water. Lasers are being used to level fields so that instead of pooling, the water soaks in evenly. Traditional earthen channels have been replaced by low-pressure plastic pipes. These prevent seepage and contain individual gates that control the flow of water to the plants so that it soaks straight into the roots.

Results are heartening. In 2007, Delicias Irrigation District succeeded in reducing its water usage to 830 million m³ – a lot lower than the 1 billion m³ of a year ago, and 62% less than the 2.2 billion m³ being used fifteen years ago. This successful water saving project is being heralded as a model case for other agricultural regions across Mexico.

New hope for the Conchos trout

The Conchos trout is a native, endemic and highly endangered trout species, and the only known Mexican trout from a river that drains into the Atlantic Ocean.

In 2005, the mountainous terrain of the Rio Conchos upper tributaries was extensively searched, and a breeding population of Conchos trout was rediscovered. This comprised 200-300 individual fish isolated in 1.5 miles of stream.



© Joe TOMELLERI

WWF's collaborative Conchos Trout Conservation Project aims to ensure that this extremely vulnerable population remains viable. We are working with the Raramuri tribe, the original indigenous people of the region, on a range of conservation programmes. The Raramuri are actively protecting this area as a result of the pride they have in being the only place where this rare fish species is currently found.

The next phase of our project involves implementing a conservation management plan and further extensive surveys of more Rio Conchos tributaries to search for other possible 'lost' populations. We are also investigating means to protect the remaining fish from invasive species, and exploring opportunities to develop local ecotourism and Conchos trout husbandry programmes to provide the local community with sustainable incomes.

APPENDIX 2

Rio Conchos Project – Outline of Key Requirements 2009/10

The following is a break-down of the various ways in which funding could be used to strengthen conservation work in the Rio Conchos basin, and to ensure that our environmental research and analysis, documentation and lobbying can continue.

£1,000 could help fund a workshop to develop a responsible ecotourism network in the Rio Conchos basin.

£1,500 could be used to help establish and restore Protected Areas in Pegüis Canyon and Pandeño Springs.

£1,750 could help strengthen the capabilities of the local grassroots organisation responsible for long-term environmental stewardship of Pandeño Springs.

£2,000 will go towards installing appropriate wastewater treatment facilities for small towns and villages in the middle of the Rio Conchos basin. This will reduce the amount of untreated waste polluting the river system.

£2,500 could be used to help support local water users in the Rio Conchos basin by helping them to work together and engage with authorities on water use and their needs.

£4,500 could go towards securing the water needed to conserve the unique Julimes pupfish at Pandeño Springs.

£5,000 could go towards monitoring the effects of the Saltcedar Leaf Beetle on the highly invasive Salt Cedar that has choked almost 200 miles of the Rio Grande.

£7,500 could help produce a white paper of recommendations on how to secure optimum quality, quantity and timing of water to Big Bend in order for it to flourish.