



When snow melts in spring, water reaches mountain streams and percolates to recharge aquifers.



The summits of Sierra Nevada are surrounded by pastures and mountain crops that provide services to more than 90,000 inhabitants who live inside the protected area. Water management is a key issue to sustain economic activity as well as ecosystem functioning.

Sierra Nevada

SPAIN

Sierra Nevada is a mountainous protected area in Andalusia, Spain, which covers more than 2,000 km² and ranges from 860 to 3,482 metres in altitude. The mountains are surrounded by pastures, forests and crops that provide services to more than 90,000 inhabitants who live inside the protected area.

grasslands and forests downhill. This process slows down the hydrological cycle, making good use of the water resources. The main industries in Sierra Nevada, including agriculture, tourism, cattle raising, skiing, beekeeping and mining, are highly dependent on this water.

From the ninth century AD onwards, Muslim settlers built more than 3,000 km of irrigation channels on the mountain slopes. Many irrigation channels divert water from the springs and streams at higher altitudes and deliver it to the crops,

Climate change has already altered the hydrology of Sierra Nevada, impacting both ecosystems and communities. At the same time, land-use change is another key driver of ecosystem structure and functioning. The park is exploring how to use the

ancient irrigation network to buffer the impacts of global change. To test this hypothesis, ECO-POTENTIAL is supporting the Sierra Nevada Global Change Observatory in the use of Earth Observation. The LIFE ADAPTAMED EU project is putting this new knowledge into practice by improving ecosystem management, such as planting and clearcutting forests. The network of irrigation channels is maintained by local water managers (acequeros), who are in charge of distributing water downhill. This initiative will help increase the resilience of the Sierra Nevada's remarkable biodiversity, including a total of 2,100 vascular plant species (20 per cent of European flora), which make it one of the most important biodiversity hotspots in the Mediterranean region.



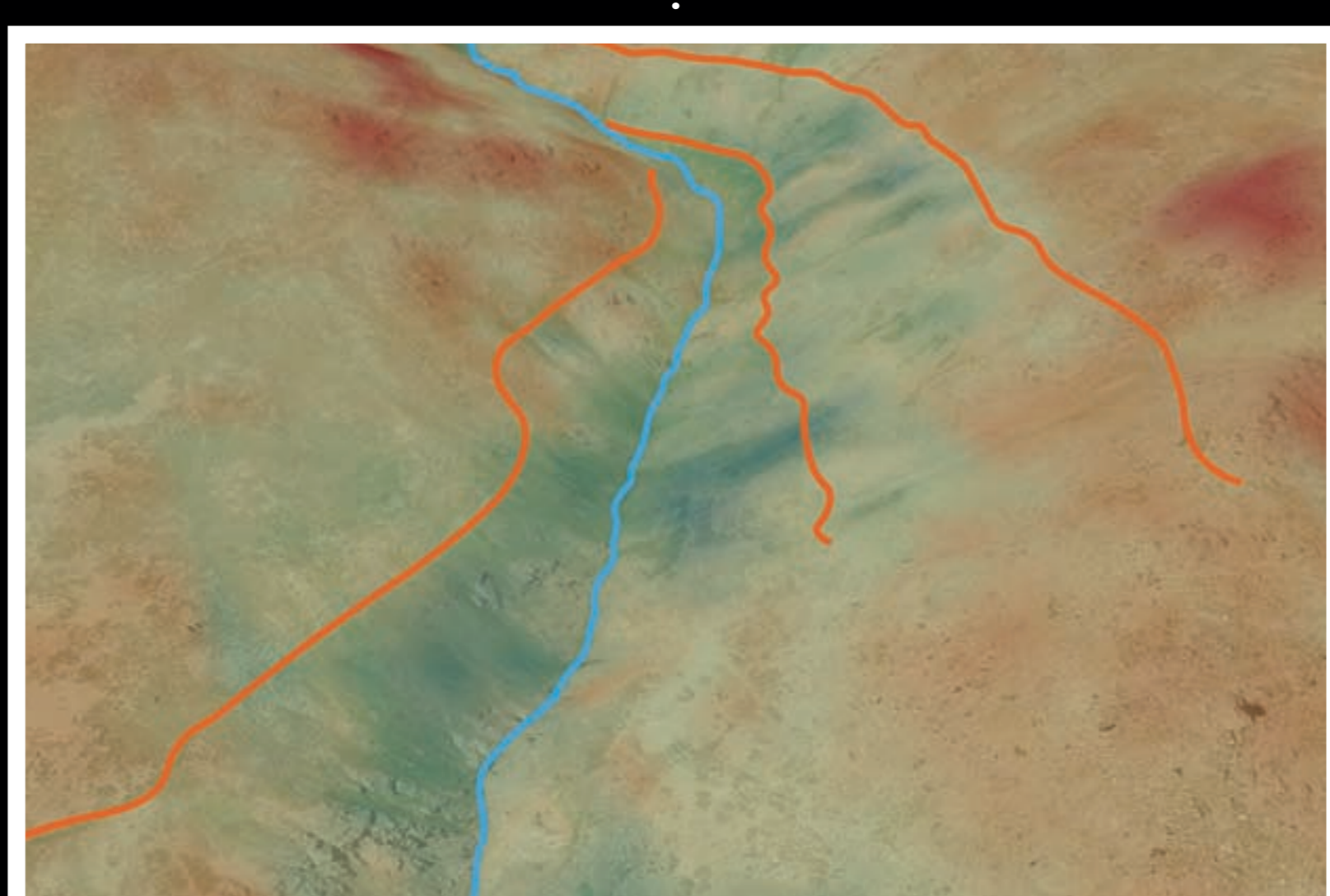
Some irrigation channels collect water from the wells at the summits.

Distribution of the natural hydrological network in Sierra Nevada (blue) in comparison with the network of ancient irrigation channels (orange). The background image shows photosynthetically active vegetation (green), bare soil and snow (both light coloured).

USGS/NASA Landsat 5 TM (19 June 2011). Irrigation channel data courtesy of EU F7 MEMOLA project.



These irrigation canals deliver water to the crops, grasslands and forests downhill. This process slows down the hydrological cycle in the mountain.



The effect of the watering provided by irrigation channels can be quantified by satellites. This picture (NDVI calculated from a Landsat image acquired on 19 June 2011) shows differences between more productive pastures beneath the channel (green) and less productive ones above (red).

Landsat courtesy of USGS/NASA Landsat program.



A local water manager maintaining an irrigation channel.