WRA Bulletin 57

July 2020

OVERSEAS WORK

Availability of irrigation water supplies, Peru

WRA Partner Harvey Rodda and previous WRA Director Andrew Wade have been working on a water resources project in the Peruvian Andes (Figure 1). They were working together with researchers from Reading University, Peru and Argentina. This project was a pilot study into the availability of water for farmers in the Cordillera Negra and Cordillera Blanca mountain ranges (Figure 2), where crops are grown at altitudes between 1500m and 3500m.

Figure 1 Study area location

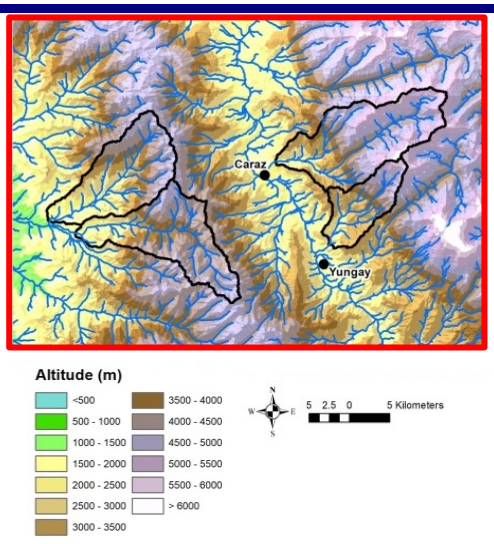


Figure 2 Study catchments in the Cordillera Negra (west) and Cordillera Blanca (east)

The work included gauging dry season flows in four small catchments (Figure 2) and estimating the crop water demand using the FAO CROPWAT model. Flows were gauged in both irrigation canals (Figure 3) and river channels (Figure 4), using dilution gauging and velocity-area methods.

Figure 3 Irrigation canal in the Cordillera Negra

Figure 4 River dilution gauging in the Cordillera Negra

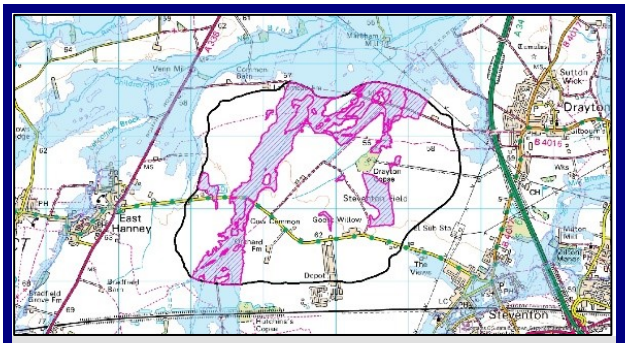
The types and areas of different crops were identified through visiting farmers, making use of municipal agricultural data, and satellite imagery. Temperature and rainfall data required as input to the CROPWAT model were provided for nearby stations in Yungay and Caraz, and supplemented with CHIRPS satellite-derived rainfall estimates. The CROPWAT simulations calculated the crop water requirements for each of the crop types identified over the dry season, the available water and the irrigation requirements. These calculated irrigation requirements were compared with available irrigation supply volumes over the season, based on the flow estimates and permitted use from irrigation canals.

Initial results suggest that the available water does not meet the current crop requirements, and less water will be available under climate change projections which indicate an increase in temperatures.

UK WORK

Flood risk concerns resulting from proposed Thames Water Reservoir, Oxfordshire

A previous review of the proposals for the Thames Water Reservoir, located between the villages of East Hanney and Steventon in Oxfordshire, had raised concerns in relation to flood risk, particularly from the resulting loss of flood storage as well as the increased risk of flooding to the road connecting East Hanney with Steventon from streams diverted around each side of the reservoir.



The boundary of the proposed Thames Water Reservoir depicted in black. The resulting areas of potential lost flood storage outlined in purple. The East Hanney-Steventon road shown by green dots.

Following this review the Group Against Reservoir Development (GARD) requested more detailed hydrological studies. WRA Partners Harvey Rodda and Frank Farquharson were involved in this work, which included the application of GIS and a digital terrain model (DTM) to estimate the loss of flood storage, a survey of the existing stream channels and culverts under the East Hanney to Steventon road, rainfall-runoff modelling using the REFH2 software to identify peak flows in two small streams, and initial hydraulic modelling to estimate the required culvert capacity for two new diverted stream channels.

The loss of flood storage had to be reproduced using the mapped EA flood outlines and a 2m grid cell DTM to generate a theoretical flood surface. The DTM-estimated ground surface levels were then subtracted from these flood surface levels to give an estimate of the flood storage volume. It was found that an estimated 730,000 cubic metres of flood storage could potentially be lost through building the proposed reservoir.

Peak design flows for the two diverted streams were estimated at 11.3 cumecs to the west of the reservoir and 1.3 cumecs to the east. Consequent flood alleviation works would require a 1.8m by 2.4m box culvert built to the west and a 1.2m diameter round culvert to the east, to convey the relevant flows under the East Hanney-Steventon road.

Existing culvert under the East Hanney-Steventon road.

The outputs of the study were presented to GARD, who will use the information to ensure that Thames Water are taking the appropriate measures in their reservoir design.

Ron Manley steps down as Partner

Ron Manley has stepped down in July 2020 as a Partner of Water Resource Associates LLP, after 26 years' involvement, but will still continue contributing as an Associate. Ron was one of the five founding Directors of Water Resource Associates Limited, along with Mike Lowing, Chris Green, David Plinston and Nick Mandeville, when the company was first incorporated on 14 October 1994. But as he is the last one to step down, this is an historic occasion, and it could be fairly claimed that the practice is now under 'New Management'. Ron played the leading role in instigating the formation of the company. While working in Bandung in Indonesia in 1990 he was visited by Jim McCulloch, ex-Director of the Institute of Hydrology (IoH) at Wallingford, who was visiting the country in his role as International Commissioner of NERC. Later in 1992, during a return training visit to UK, doubtless over 'a wee dram', Ron suggested to Jim the possibility of creating a grouping of independent consultants tentatively called "Hydrology Associates". Jim liked the idea, and sounded out several ex-IoH staff. After another 18 months, Mike Lowing contacted Ron, to ascertain his continuing interest, and the rest is history……

Next WRA Board Meeting

Friday 16th October 2020, connecting by Zoom

The WRA Bulletin is a quarterly publication, and relies on contributions submitted by Partners, Associates and Consultants. The document is circulated by email, and published on the WRA web-site, aiming to keep the WRA network up-to-date with respect to current activities. Please email contributions for future issues to Nick Mandeville: nick@watres.com

Water Resource Associates LLP, PO Box 838, Wallingford, Oxon OX10 9XA. Tel: +44[0] 1491 838 190, www.watres.com