

## OVERSEAS WORK

### UAE Dam Inspection

The condition and safety of six dams were assessed in December 2011 in the Hajar Mountains of the UAE at Wadis Ham, Hayl, Buraq, Mai, & Muzaira, identifying problems and suggesting remedial measures.



Sifuni Dam

The assignment was carried out by Paul Holmes and Andy Sheerman-Chase of CARES, involving field reconnaissance and site inspection, and a brief desk review of available documentation provided by the Ministry of Environment & Water, at CONSER's Dubai office [Lead consultant].



The Inspection Team at Wadi Mai

The work was supported by the review of satellite imagery to assess catchment conditions and new developments downstream of the dams. Sifuni Dam was inspected in 2010, and a return visit was made to assess the level of seepage.

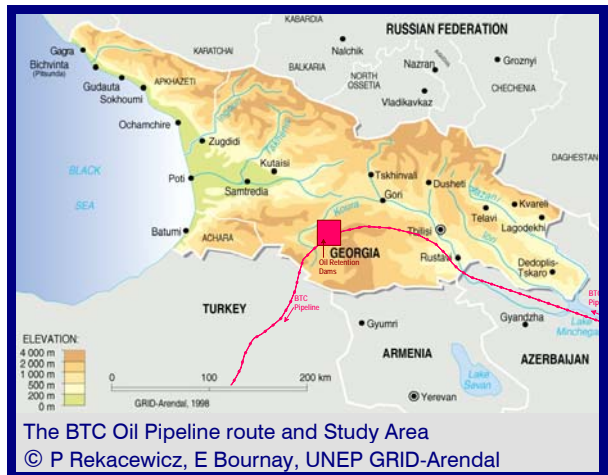


Measuring seepage at V-Notch downstream of Sifuni Dam

### Georgia, Borjomula

WRA has completed a review of oil retention basins in the headwaters of the Borjomula River, for the Georgian Oil And Gas Corporation [GOGC]. The basins aim to minimise environmental damage in the event of leaks and accidents on the Baku-Tbilisi-Ceyran oil pipeline.

GOGC acts as an implementation watchdog for the state, and is concerned that there may be flaws in the performance of the oil retention basins, designed by Black and Veatch in 2006, and built in 2008-09.



Frank Farquharson reviewed the flood hydrology and Ian Eames[UCL] looked in detail at the fluid dynamics of the retention basins, assessing the behaviour of oil in the basin, especially critical flow velocities, droplet entrainment and vortex formation at the outlet gates.



The Borjomula Catchment

Despite a lack of crucial information in certain areas of the BTC project reports, it was concluded that under normal flow conditions the retention basins may perform as expected, but there are doubts over their behaviour in flood conditions. It is expected that WRA will continue to represent GOGC in discussions with BP during 2012.

## UK WORK

### Bonar Bridge Water Supply

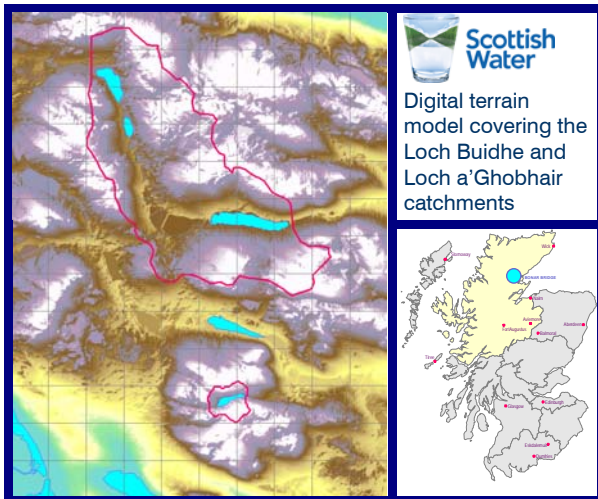
Continuing work for Scottish Water, a number of new projects started towards the end of 2011, focusing on the development of HYSIM-AQUATOR models.

Paul Holmes is engaged on the Bonar Bridge public water supply scheme, where AECOM has a design-and-build contract with George Leslie Ltd to remodel the existing treatment works and develop a new source at Loch Buidhe. The engineering needs to be based on sound estimates of source yield, and the HYSIM-AQUATOR modelling aims to address the yield and abstraction licence requirements.



Loch a'Ghobhair, source of supply for Bonar Bridge

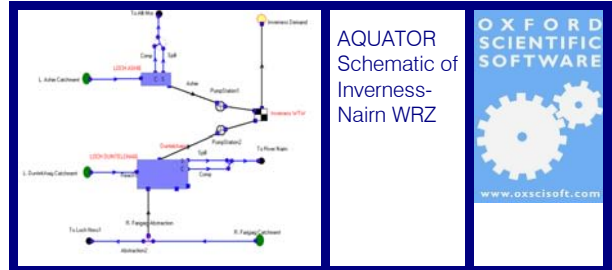
The existing source at Loch a'Ghobhair sits on the Migdale pluton, and is strikingly different to the Buidhe catchment further north which is covered in blanket peat deposits. Harvey Rodda has produced the DTM from OS Landform Profile data.



Met Office manuscript data from the Edinburgh archive were processed to provide the early historic rainfall record back to 1922. Durkadale on the Orkney Isles was used as one of the analogue catchments.

### Inverness Water Supply

Chris Green is in the process of optimising operational strategies for the Inverness-Nairn water resource zone model, using AQUATOR-GA. This is a powerful new tool which OSS has developed in recent years with Exeter University, involving Genetic Algorithms.



Inverness and Nairn are served by three sources: Loch Duntelchaig, Loch Ashie and the Farigaig River, which flows into Loch Ness. The main aim of the job is to derive reservoir control curves for optimisation of the blend between the two lochs, while increasing abstraction from Ashie and minimising pumping from the Farigaig.



Loch Duntelchaig

### WRA Director/Associate News

**Dr Jill Crossman** joins as Associate hydroecologist. Her research interests lie in surface-groundwater flow pathways and nutrient dynamics, and is working with Paul Whitehead on macronutrient cycles, and investigating local variability in groundwater flow pathways of glaciated catchments in Alaska. Jill received the 30<sup>th</sup> RGS International Symposium Award.



**Julian Smith** joins WRA as Associate engineering hydrologist, bringing 40 years of experience of the British water industry and overseas hydrology. He specialises in computer applications for hydrology and water resources analysis, flood risk assessment and mitigation, and has been involved in water company OFWAT audits public inquiries.



### WRA Board Meeting

20 April 2012, Brightwell-cum-Sotwell

The **WRA Bulletin** is a quarterly publication, and relies on contributions submitted by Directors, 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 Paul Holmes: [pach@watres.com](mailto:pach@watres.com)

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