Water Resource Associates

A network of consultants in hydraulics, hydrology, groundwater & environmental issues

Project title: **Feasibility Study of Upper Tama Koshi Hydroelectric Project**

Summary: Hydrological studies of yield and flood frequency for run-of-river hydroelectric power scheme.

Client: Nepal Electricity Authority	**Financed by:** NORAD (Norwegian Aid)
Period of assignment: Jan-Dec 2004	**Location**: Nepal
Project Value: Unknown	**WRA services**: £15 000
In co-operation with: NORCONSULT	**Background**

Lamabagar gauging station on Tama Koshi river

Water Resource Associates assisted the lead consultant Norconsult International by conducting the hydrology studies in this project. The scheme is located in the Dolakha district of central Nepal, and it is necessary to trek for two days from the nearest road-head at Singati Bajar to reach the project site, located close to the northern border with Tibet. The scheme will harness the Upper Tama Koshi river, which has a mean annual flow of 67 m^3/s at the headworks, by means of a 7 km long head race tunnel, a 790 m fall of water through the penstock, an underground power house containing several Pelton wheel turbines, and a tailrace of 3 km. This high head scheme has the potential to produce 350 MW of power, to increase the current supply to Kathmandu and other industrial towns of Nepal.

Site of proposed intake dam

Scope of work by Water Resource Associates Ltd

The scope of work included all those hydrological analyses normally undertaken for a major hydropower design study, including revision of rating curves, flow duration curves, low flow frequency, flood estimates at both the intake headworks and tailrace outlet, and examination of the tributary contributions to the reach between the intake dam and the tailrace outlet.

Investigations were also made of a major tributary, the Rolwaling Khola, which entered the Upper Tama Koshi river midway between the intake dam and the location of the power hose. Due to the higher elevation of its stream channel, it would be possible to divert this flow through a 6.5 km tunnel to the pond upstream of the main intake dam. This would increase the flow available to the main scheme during the dry season by 15 %, under a future Phase 2 development.

Results

The study was challenging for three main reasons. First, a natural landslide, 300 m high, blocked the steep river valley over 500 years ago to create a pool behind it, which is now filled with sediment. This level area is large enough for the erection of a 15 m high intake dam to create a 2 km long shallow reservoir, to allow daily peaking capacity at the power plant.

Second, the catchment upstream of the intake dam lies behind the Himalayan range, and the Tama Koshi river emerges through a gorge between the adjoining peaks, which each rise to over 7200 m. This creates a rain-shadow, so the hydrological behaviour of the Upper Tama Koshi river is different to that of the majority of other catchments in Nepal, and it was necessary to correlate the short record of observed flows with a longer 35 year record from the Trisuli river at Betrawati. This river lies further to the west of the Tama Koshi, but shares the same characteristic of its upper catchment lying behind the main Himalayan range.

Third, the small tributary sub-catchments lying, between the intake dam and the tailrace outlet, receive heavy monsoon rainfall, so have a specific runoff of 84 $l/s/km^2$, which is over twice the value, 39 $l/s/km^2$, for the main upstream catchment.

Project Number 000119

Directors
Frank A K Farquharson
Paul A C Holmes
Dr A Nick Mandeville
Ronald E Manley
Dr Andrew J Wade
Professor Paul G Whitehead

Head Office:
PO Box 838
Wallingford
Oxon OX10 9XA
Tel: +44 (0) 1491 838190
E-mail: info@watres.com

Company Registered in England Number 2979072 Registered Office: 25 Hart Street, Henley-on-Thames, Oxon. RG9 2AR
VAT Registration No 630 813170