AUTOMATIC TRACER FLOW GAUGING STATIONS IN EPHEMERAL RIVERS

(NAM/8/003) F4 New

MODEL PROJECT

CORE FINANCING

YEAR	Experts		Group Activity	Equipment	Fellowships		Scientific Visits		Group Training	Sub-Contracts	Misc. Comp.	TOTAL
	m/d	US $	US $	US $	m/d	US $	m/d	US $	US $	US $	US $	US $
1999	2/0	29,400	0	80,000	4/0	13,800	1/0	10,800	0	0	0	134,000
2000	1/15	23,175	0	50,000	2/0	7,200	1/0	11,400	0	0	0	91,775

First Year Approved: 1999

OBJECTIVES: To develop an operational system for automated tracer flow gaugings during flash floods in ephemeral rivers to provide reliable data for the sustainable exploitation of water resources.

BACKGROUND: The scarcity of water, due to the semi-arid to arid conditions, is the most constraining factor for any development in Namibia. Water supply infrastructure in the interior of Namibia has to rely on impoundments or aquifers fed by flash floods in ephemeral rivers. The determination of the magnitude of these events relies on the conversion of automatically recorded water stages to instantaneous discharges and flow volumes. The establishment of a reliable stage-to-discharge relationship depends on the availability of flow gaugings, which are difficult to carry out in the conventional manner. It is rarely possible to be on site during floods because there is no early warning, many stations are in isolated areas, and travelling is problematic and time consuming. Because of high velocities, sediment transport and turbulence, propeller instruments cannot be taken through river sections, and therefore only a theoretical stage-to-discharge rating is available at most stations to calculate flows, and the reliability and accuracy of the derived flow statistics is often dubious. As the water of these rivers ultimately infiltrates the soil, it is the main recharge of local aquifers. To achieve Government social and economic development goals and to provide the population with access to safe water for drinking, personal hygiene and other domestic purposes, it is a necessary step in ensuring water supply to develop a reliable method for the automatic measurement of flow rate in the ephemeral rivers. The gauging of these rivers by dilution of radioactive tracers, using automatic electromechanic systems, seems to be the best (if not the only) method applicable in these conditions.

PROJECT PLAN: Project NAM/8/002 indicated that a good performance could be expected from tracer flow gaugings, due to the confined flow sections and high turbulence, and they would not require the traversing of river sections. The gaugings, however, should be triggered automatically by the arrival of a large flood and then carried out automatically at short intervals to cover the hydrograph of the flood. Once a site is rated, the system could be moved to another river flow station. In this project, two sites will be fully installed and tested. The first site will be a prototype set-up in a small river with relatively frequent flow near the offices of the Namibian Hydrological Services as such a site enables good flood warning and instrumentation checking during automatic gaugings. The first tracer gaugings can be performed manually in order to determine suitable sections and release and sampling positions. This site will be installed during the first year and operated for at least the two years of the project. The second site will be a full test set-up at an existing station with an immediate need for accurate flow data in one of the larger rivers and will be installed and operated during the second year of the project. Expected outputs: Phase 1: At the prototype site, an automatic flow gauging system will be established which can be used for further investigation and for staff training. Phase 2: At the test site, an automatic flow gauging system will be established which can be used for the rating of that station and then moved to/duplicated at other stations. Much better flow data for one important site will be established.

NATIONAL COMMITMENT: Infrastructure and equipment, including six vehicles and one helicopter; project personnel; and operational budget.

AGENCY INPUT: Expert services, equipment and training.

PROJECT IMPACT: The establishment of automated tracer flow gauging system and the developed capacity of Namibian staff to operate such a system will enhance the availability of accurate riverflow information. This is a primary prerequisite for the technical, economic and environmental evaluation and the optimal operation of the country's interior water resources. The successful development of an automatic tracer flow gauging system will enable major progress in water resource assessment and utilization in Namibia.