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KINGDOM OF LESOTHO - PROGRESS REPORTS BY
SIEN JALUBI, HYDROLOGIST, OPAS EXPERT

70LTK76-6 SEPT
1977

UNITED NATIONS
ASSOCIATE EXPERT

UNCLASSIFIED
10/10 MAR 2015

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SERIES S-1906
BOX 73
FILE 6
ACC. 1E 432/2 ,

OFFICE OF TECHNICAL CO-OPERATION

I. Experts' Reports: Referral to Substantive Offices

Mr. G. Rao, Senior Technical Adviser,

Date:

21 September 1977

To: the Substantive Office:

CNRET

File No.:

TE 322/1 LESO (112-1)

Through: K. Chhor, Chief, East, Southern Africa and
Regional Projects Section, OTC (Area Section Chief)

From: A. Diallo, PMO, East, Southern Africa and

Regional Projects Section, OTC/ESA

Subject: Request for Comments

RECORDS CONTROL

SEP 21 1977

Please find attached the following Progress Report No.
Outline of Final Report*, letter / memorandum:

Name of expert: Sven Jacobi, Hydrologist
(OPAS)

Field: Hydrology

Country: Lesotho

Date: November 1976-August 1977

I should appreciate your action on the attachment as indicated below, before

5 October 1977

(date)

II. Experts' Reports: Action by the Substantive Office

From the Substantive Office: _____

1. _____ A memorandum giving substantive comments on the above is attached (3 copies) for transmittal to the field as appropriate.
2. _____ A letter addressed to the expert is attached for clearance and return (2 copies included for the Area Section)
3. Indicate disposal of comments from the Regional Secretariat:
 - _____ a. Endorsed for transmittal to the expert
 - _____ b. Consolidated with Headquarters comments
4. Indicate whether the expert fulfilled the requirements with respect to:
 - _____ a. Carrying out responsibilities outlined in his job description
 - _____ b. Training counterparts
 - _____ c. Other (indicate)

Signed: _____

Date: _____

* A different form is used for comments on Final Report.

ENCLOSURE ATTACHED

UNITED NATIONS



DEVELOPMENT PROGRAMME

CREDIT UNION HOUSE,
KINGSWAY,
MASERU,
LESOTHO

Reference: LES/SIDA/10

P.O. BOX MS 301
Tele. 342 BB
Cable Address: UNDEVPRO
Telephone: 3790, 3791

13 SEP 1977
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BY POUCH

Dear Mr. Chhor,

Subject: LES/SIDA/10 (LES/75/T04) - Hydrologist (OPAS)

Please find for your review and records, a copy of the progress report for the period, November 1976 to August 1977, prepared by Mr. S.J. Jacobi, Associate Expert under the above project.

Yours sincerely,

O. Yucer
O. Yucer
for Resident Representative

Mr. K. Chhor
Chief
East, Southern Africa and Regional Projects
UNOTC - New York

cc: Mr. T. Gordon-Somers
Chief
East Africa Division
RBA, UNDP, New York

Ms Anne Bruzelius
Desk Officer for Lesotho
SIDA
S10525 Stockholm - Sweden


RECEIVED

SEP 14 1977

SECTION FOR EAST SOUTHERN
AFRICA AND REGIONAL PROJECTS
AFRICA BRANCH
OTC

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	UNITED NATIONS DEVELOPMENT PROGRAMME				FORM A SUMMARY
	PROJECT PROGRESS REPORT	PROJECT NUMBER LES/SIDA/10 (LES-150-097-V)	AGENCY UN-OTC	REPORTING PERIOD 10/76-9/77	

COUNTRY AND PROJECT TITLE: LESOTHO, ASSISTANT HYDROLOGIST (ASSOCIATE EXPERT)			DURATION		UNDP BUDGET (\$US)
DATE PROJECT APPROVED	START OF FIELD WORK		COMPLETION OF FIELD WORK		TRIPARTITE REVIEW? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> DATE:
	SCHEDULED 17.03.76	ACTUAL 17.03.76	ORIGINAL EST. 16.03.77	CURRENT EST. 16.03.78	

Summary of Project Implementation


The present progress report covers the Officer's activities at the Hydrological and Meteorological Services, Ministry of Works, for the period October 1976 up to September 1977.

Some of the activities in this second reporting period are the same as described in the Officer's first Progress Report (4/76 - 10/76) for which reason there will be some coinciding points between the two reports. The duties of the Assistant Hydrologist as defined in his job description are to assist the Senior Hydrologist in all his duties. In practice this means that the Assistant Hydrologist participates directly in all the technical, hydrological work both in the field and at the office, whereas the administrative and financial management of the Department is the responsibility of the Senior Hydrologist.

In short the Officer has been involved in the following activities during this second reporting period:

- Field work. Assist and advise the senior field assistant (local) in matters concerning the hydrological field work which is carried out under his responsibility. Be in charge of the first manometer-servo bubble gauge installation in Lesotho.
- Processing runoff data. Supervise the computing staff and process the incoming water level data to daily, monthly, and annual runoff records in cooperation with the Senior Hydrologist.
- Sediment sampling and analysis. Collect approximately 225 sediment

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	UNITED NATIONS DEVELOPMENT PROGRAMME			FORM A SUMMARY
	PROJECT PROGRESS REPORT	PROJECT NUMBER LES/SIDA/10 (LES-150-097-V)	AGENCY UN-OTC	

COUNTRY AND PROJECT TITLE: LESOTHO, ASSISTANT HYDROLOGIST (ASSOCIATE EXPERT)			DURATION		UNDP BUDGET (\$US)
DATE PROJECT APPROVED	START OF FIELD WORK		COMPLETION OF FIELD WORK		TRIPARTITE REVIEW? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
	SCHEDULED 17.03.76	ACTUAL 17.03.76	ORIGINAL EST. 16.03.77	CURRENT EST. 16.03.78	

Summary of Project Implementation (CONTINUED)

samples from various rivers in the country and carry out concentration analysis of the samples in the laboratory. Apply the sediment data in an investigation to obtain estimates of the annual sediment yield conditions. This study resulted in a report entitled "Sediment load estimates of rivers in Lesotho".

- In-service training. Prepare notes and conduct lectures as a formal training for the technical staff. The lectures included topics in the fields of both hydrology and meteorology.
- Miscellaneous tasks. Assist the Senior Hydrologist in his extensive study on various aspects of the surface hydrology of Lesotho. On request from outside departments or consultants, prepare material including topics as peak flow analysis, unit hydrograph analysis, and grain-size distribution tests of river sediment.

As it was also mentioned in the Officer's first progress report, the overall impression is that the day-to-day work in the Department is performed satisfactorily mainly due to the fact that the senior assistants (all local) in charge of the different sections are competent and responsible. Only a very few times during the past year have unforeseen problems (often related to transportation up to the remote mountain gauging stations) created setbacks which made it difficult to keep the records up-to-date. This improvement is definitely due to the fact that the newer (or repaired) installations are built more adequately and that the staff is now more experienced in handling abnormal conditions.

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UNITED NATIONS DEVELOPMENT PROGRAMME

PROJECT PROGRESS
REPORTPROJECT NUMBER
LES/SIDA/10
(LES-150-097-V)AGENCY
UN-OTCREPORTING PERIOD
10/76-9/77FORM B
GENERAL
ACCOUNTGeneral Account of Project ImplementationField work.

The primary purpose of the Hydrological Department is to collect and process data of stream runoff in Lesotho. To that end a network of river gauging stations equipped with automatic recorders currently numbers a total of 35 stations, incl. one installed in January and one just finished.

The main tasks for the field section (approximately 15 men) are to make the necessary number of discharge measurements for the proper definition of the rating curves, check the functioning of the automatic Stevens water level recorders, strip the recorder charts monthly, and finally carry on with repair work and cleaning when needed. The job done by the field teams under the competent supervision of the senior field assistant is now so experienced that no particular assistance or advice seems needed in connection with the routine discharge measurements, discharge computations, and instrument maintenance. For that reason the Associate Hydrologist's field work has been kept down to a minimum and has only amounted to occasional assistance and advice in connection with ongoing repair work and when sudden shortage of staff occurred during a few peak runoff periods in the wet season.

In January the Officer was put in charge of the installation of the first bubble gauge in Lesotho. So far all the other gauging stations have been equipped with the standard float-type instruments, and it was decided to try out the manometer-servo bubble gauge at a new station erected on the Caledon River at Maseru. One of the main advantages of a bubble gauge compared with a float gauge is that no stilling well or tower is required. This cuts down considerably on the installation costs at those sites where the construction of a tower will be expensive and time consuming, and where a tower near the river bank can not be protected sufficiently against flood waters. The entire installation including



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bubble tube, outlet in the river, protecting brick house, etc. was completed during a few weeks in January. The instrument was put into operation at the end of the month and has been functioning satisfactorily since then.

Processing of runoff data.

The staff in the computing section comprises four assistants and the Hydrologists. Recorder charts are brought in from the field and interpreted ("base line" drawn in, etc.) by the Hydrologists, and for each day three 8-hour mean stage figures are worked out by the assistants. From rating tables the corresponding discharge values are taken and entered on the appropriate forms by the Officer, and finally the daily and monthly runoff values are computed.

The computational work has been progressing smoothly and kept up-to-date throughout the reporting period with the result that runoff data are now available up to the start of August for all gauging stations with only a few exceptions. Periodically a few of the stations encounter a shift in the rating, and consequently new rating curves, equations, and tables have to be worked out before the daily discharge figures can be obtained.

Sediment sampling and analysis.

At the end of the last reporting period (see first Progress Report, 4/76-10/76) the Officer was put in charge of a sediment sampling programme aimed at obtaining estimates of the rate of sediment transport in some rivers in Lesotho. It is a well known fact that the soil erosion, sediment transport, and deposition of silt and sand are important factors to be considered in Lesotho in connection with the planning and design of



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water related projects. During the last year the Hydrological Department has experienced an increasing number of requests from agencies and consultants who require information about the sediment transport in the river network of the country. These requests have further actuated the sediment sampling programme which last August ~~initiated~~ initially ran on a rather small scale.

Samples have been taken regularly from 11 sites representing different parts of the country, and frequently from one station south of Maseru (the Little Caledon River at Masianokeng), which represents the sediment transport conditions of a typical lowland-foothills catchment.

During the reporting period a total of approximately 225 sediment samples have been collected in the field and analyzed in the laboratory. Out of this amount of samples a little less than half were taken at the Little Caledon site alone. Sediment concentration analysis only is carried out on the samples by applying the evaporation method. However, this is also the most important characteristic since the concentration of suspended sediment can lead directly to an estimate of the sediment load, i.e. the rate at which the river transports eroded material.

The Officer devoted considerable amount of time during the period May to July to write a report based on the laboratory analysis results entitled "Sediment load estimates of rivers in Lesotho". In the report relationships between water discharge and sediment load were established for four catchments (two in the lowland-foothills region and two in the mountains). Once these relationships were defined, a complete six-year period (1971 - 1976) of daily runoff data could be applied to obtain an estimate of the average sediment load conditions in the four rivers. Consideration is also given in the report to important aspects as the rate of deposition of material in a possible future reservoir, and the amount of total dissolved solids (salts and minerals) in the water. The



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report was published in July and forwarded to interested departments, agencies, and consultants both inside and outside Lesotho.

Recently a US-DH-59 depth-integrating sampler was made available to the Hydrological Department and work has been initiated to compare the average cross-sectional sediment concentration with the "grab" sampling results so far used in the sediment load computations. Such a study may result in an adjustment of some of the values given in the above mentioned report.


In-service training.

As a consequence of the positive response to the last two years training, it was decided to continue the formal in-service training for all technical staff of the Department. The lectures are most conveniently held during the dry season (when the activity of the field teams away from the office is at its lowest); and for that reason, the training was given in two one-week periods in July and August. Again this year the lectures were held under the responsibility of the Officer helped by the Senior and Associate Meteorologists.

The topics of the lectures this season were:

- Instruction in the use of the bubble gauge.
- Maintenance of discharge measurement equipment.
- Sediment analysis and sediment load calculations.
- Statistical tools in hydrology.
- Agricultural meteorology.
- Meteorological instruments.
- Concepts of climatology.

With some of the topics, lecture notes were handed out to the staff. In

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General Account of Project Implementation

addition tours to relevant instrument installations were offered, and classroom exercises were held to further emphasize the main points in the lectures. In connection with the sediment sampling programme, on-the-job training in the field and laboratory techniques has also been given to the technical staff concerned.

Miscellaneous tasks.

With sufficient and well experienced staff in the computing section the current office work and day-to-day computations of runoff data have not been subject to any prolonged back-log of unprocessed data. For that reason the Officer has been able to devote more time on a broader spectrum of subjects related to the hydrology of Lesotho. One result of this has been the above mentioned study and subsequent report on the sediment transport in some of the rivers in Lesotho.

In the period March to May the Officer assisted the Senior Hydrologist in his study on the surface hydrology of Lesotho. The assistance amounted to some preliminary analyses of the relationships between precipitation and measured runoff of the more than thirty catchments in Lesotho. In the final report the Officer assisted as draughtsman for the extensive number of figures and maps.

Other topics which have been dealt with on request from outside departments or consultants are: peak flow analysis, unit hydrograph analysis, additional runoff data processing, and laboratory tests to obtain grain-size distributions of suspended sediment and bed material from the Phuthiatsana River north of Maseru.



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ACCOUNTGeneral Account of Project ImplementationConcluding remarks.

The Officer's opinion is that the project, now in its final stage, as a whole has been progressing satisfactorily. The addition of the sediment sampling and analysis programme has proved in the past year to be an important activity, which will be included in the Department's routine work in the future.

With reference to the activities described in the present report, the Officer has devoted the following amount of time on each item. The time spent is given as a percentage of total working time and should be considered rather approximate:

- Field work	:	15 %
- Processing runoff data	:	15 %
- Sediment sampling and analysis	:	35 %
- In-service training	:	15 %
- Miscellaneous tasks	:	20 %

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UNITED NATIONS DEVELOPMENT PROGRAMME

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(LES-150-097-V)AGENCY
UN-OTCREPORTING PERIOD
10/76-9/77

FORM E-1

AGENCY
PERSONNEL

POST NO.	POST DESCRIPTION	NAME OF INCUMBENT (AND NATIONALITY)	ARRIVED (MO/YR)		DEPARTED (MO/YR)	
			SCHED.	ACTUAL (EST.)	SCHED.	ACTUAL (EST.)
	Assistant Hydrologist (Associate Expert)	SVEN JACOBI (Danish)	3/76	3/76	3/77	3/78

REMARKS:

ENCLOSURE ATTACHED
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OXFAM HOUSE,
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Reference:

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7 October 1976

BY POUCH

11 OCT 1976
ACTION TO:
1. ~~Miss Weidlund~~
2. ~~Diaries~~
3. ~~PUT AWAY~~
INITIALS: *PS*
☐ BRING FORWARD
ON: DAY MONTH YR.

Dear Miss Weidlund,

TE432/21 LESO(9)
LES/SIDA/10 - Hydrology - Associate Expert

... Attached for your review and records is a copy of the progress report for the period April 1976 to September 1976, prepared by the Associate Expert attached to this project.

I should advise that we have no comments on this report.

Yours sincerely,

A.T. Kabbah
A.T. Kabbah
Resident Representative

Miss J. Weidlund,
Chief,
Africa Branch,
OTC/UN
New York.

OFFICIAL CORRESPONDENCE	CONTROL NO.
MUST BE RETURNED TO RECORDS CONTROL, ROOM 2074	<i>10/480</i>

cc: Mr. T. Gordon-Somers,
Chief,
Division for East and Southern Africa,
RBA, UNDP, New York.
Central Planning and Development Office.
Ministry of Works.
Mr. S. Jacobi.

*cc, CNRET
for comments
if necessary
A. Weidlund
12-10-76*

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EAST & SOUTHERN AFRICA SECTION
AFRICA BRANCH
OTC

14 Oct 1976

	UNITED NATIONS DEVELOPMENT PROGRAMME				FORM A SUMMARY
	PROJECT PROGRESS REPORT	PROJECT NUMBER LES-150-097-V (LES/SIDA/10)	AGENCY UNOTC	REPORTING PERIOD 4/76-10/76	

COUNTRY AND PROJECT TITLE: LESOTHO, ASSISTANT HYDROLOGIST (ASSOCIATE EXPERT)			DURATION	UNDP BUDGET (\$US)	
DATE PROJECT APPROVED	START OF FIELD WORK		COMPLETION OF FIELD WORK		TRIPARTITE REVIEW? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> DATE:
	SCHEDULED 17.03.76	ACTUAL 17.03.76	ORIGINAL EST. 16.03.77	CURRENT EST. 16.03.78	

Summary of Project Implementation


The Officer arrived at the duty station March 19, 1976 and took up his post at the Department of Hydrological and Meteorological Services (HYMET) a few days later. This report covers the activities of the Officer for the period from late March 1976 up to October 1976.

The duties of the Assistant Hydrologist as defined in the job description are to assist the Senior Hydrologist in all his duties. In practice this means that the Assistant Hydrologist participates directly in the technical, hydrological work both in the field and at the office, whereas the administrative and financial management of HYMET is entirely the responsibility of the Senior Hydrologist.

In short the Officer has been involved in the following activities during his first half year of service:

- Assist and advise the senior field assistant (local) in matters concerning the hydrological field work which is carried out under his responsibility.
- Supervise the computing staff and process the incoming water level data to daily flow records in cooperation with the Senior Hydrologist.
- Prepare and conduct lectures as an in-service training for the technical staff of the HYMET.
- Prepare annual rainfall maps and initiate a regional investigation of catchment area, precipitation, and runoff parameters in collaboration with the Senior Hydrologist.

NAME OF PROJECT MANAGER/EXPERT AND DATE Sven Jacobi Sept. 29, 1976		FORMS SUBMITTED (CHECK) A <input checked="" type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E-1 <input checked="" type="checkbox"/> E-2 <input type="checkbox"/> F <input type="checkbox"/> G <input type="checkbox"/> H <input type="checkbox"/> I-1 <input type="checkbox"/> I-2 <input type="checkbox"/>
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	UNITED NATIONS DEVELOPMENT PROGRAMME			FORM A SUMMARY
	PROJECT PROGRESS REPORT	PROJECT NUMBER LES-150-097-V	AGENCY UNOTC	

COUNTRY AND PROJECT TITLE:			DURATION	UNDP BUDGET (\$US)
DATE PROJECT APPROVED	START OF FIELD WORK		COMPLETION OF FIELD WORK	
	SCHEDULED	ACTUAL	ORIGINAL EST.	CURRENT EST.
TRIPARTITE REVIEW? YES <input type="checkbox"/> NO <input type="checkbox"/>				DATE:

Summary of Project Implementation (continued)

- Organise the start of a sediment sampling and analysis programme. Furthermore, apply old unprocessed sediment data with the purpose of obtaining an estimate of the annual sediment yield from a lowland and mountain catchment.

The Officer's overall impression is that the day-to-day work in HYMET is well organised and performed satisfactorily mainly due to the fact that the senior assistants (all local) in charge of the different sections appear competent and responsible. However, sometimes unforeseen problems (mostly related to transportation up to the remote mountain gauging stations) create setbacks which make it difficult to keep the records up-to-date, and even to have urgent repair work carried out. It should be mentioned, that the transportation situation has improved somewhat over the last half year with the allocation of more vehicles to the HYMET.

NAME OF PROJECT MANAGER/EXPERT AND DATE ASS. Sven Jacobi Sept. 29, 1976	FORMS SUBMITTED (CHECK) <table> <tr> <td>A</td><td>B</td><td>C</td><td>D</td><td>E-1</td><td>E-2</td><td>F</td><td>G</td><td>H</td><td>I-1</td><td>I-2</td> </tr> <tr> <td><input checked="" type="checkbox"/></td><td><input checked="" type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input checked="" type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td> </tr> </table>	A	B	C	D	E-1	E-2	F	G	H	I-1	I-2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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GENERAL
ACCOUNTGeneral Account of Project ImplementationField work:

During the reporting period the Officer has visited approximately half of the 33 river gauging stations currently installed with automatic recorders accompanied by the senior field assistant.

The main tasks for the field section are to make the necessary number of discharge measurements for the proper definition of the rating curves, check the functioning of the automatic water level recorders, strip the recorder chart, and finally carry on with repair work and cleaning when needed. The experience of the field teams under the very competent supervision and direction of the senior field assistant is now so good that no particular assistance or advice seems needed in connection with the routine discharge measurements, discharge computations, and instrument maintenance. For that reason the Associate Hydrologist's field work has been kept down to a minimum and has only amounted to occasional assistance and advice in connection with the ongoing repair work at many of the gauging stations as a result of the heavy floods in February-March this year.

Data processing:

The staff in the computing section comprises four assistants and the Hydrologists. Recorder charts are brought in from the field and interpreted ("base line" drawn in, etc.) by the Hydrologists, and for each day three 8-hour mean stage figures are worked out by the assistants. From rating tables the corresponding discharge values are taken and entered on the appropriate forms by the Hydrologists, who finally compute the daily and monthly discharges.

In the first part of the reporting period a considerable amount of time was devoted by the Associate Hydrologist on these computations,



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because a certain back log of unprocessed data was present. This back log was caused by the fact that the Senior Hydrologist was on leave during the last quarter of 1975, and that the post of Assistant Hydrologist was not filled from November 1975 to March 1976. A second factor which put some pressure on the computing section was caused by the extreme floods. A number of the lowland stations had encountered a shift in the rating, and consequently new rating curves, equations, and tables had to be worked out before the daily discharge figures could be obtained.

In this context it can also be mentioned that the Officer assisted the Senior Hydrologist with the proof-readings of the hydrological yearbook covering the period 1970-74. The book presents a short description of each station, its location and characteristics, and gives the total flow, instantaneous peak and minimum discharges in a tabular form on a monthly basis, and also sums up the total annual flow. The yearbook was released from the printer in early September.

Training:

As a consequence to the satisfactory result of the training given last year for the hydrological staff of HYMET, it was decided to continue and somewhat intensify the formal in-service training this year. The lectures are most conveniently held during the dry season (where the activity of the field teams away from the office is at its lowest); and for that reason, the training was given in a one-week period in each of the months July-August-September. The lectures were open for all technical personnel in the HYMET and held under the responsibility of the Associate Hydrologist.

Last year the lectures concentrated mainly on the hydrological



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field practices currently used in Lesotho and the maintenance of discharge measurement equipment (current meters, cable ways, etc.). This past season the lectures have been broader in scope and covered hydrological as well as meteorological topics. The lectures in meteorology were prepared and given by the Senior Meteorologist with the exception of one day where the Associate Meteorologist introduced the staff to the different weather instruments currently installed in Lesotho.

The headlines of the lectures prepared and given by the Officer were:

- The concepts of hydrology.
- Some statistical tools in hydrology.
- Methods for gauging streams.
- Sediment sampling and analysis.
- Land surveying.

A set of notes pertaining to each of the topics has been handed out to the staff in the classroom. Hopefully these notes will be used by the personnel as self-study material as a follow up to the lectures. It should also be mentioned that a series of exercises were held in an attempt to put more emphasis on the main points in the lectures and to test how much of the material had been understood.

Generally it can be said that the lectures were carried out to everyone's satisfaction and without a doubt, were beneficial to the staff members of HYMET.

General hydrological investigations:

After the return of the Senior Hydrologist's counterpart in July from training in Canada, the responsibility of the current



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office work and day-to-day computations has been shared by the counterpart, with the welcome result that the Assistant Hydrologist has been able to devote more time on a broader spectrum of subjects related to the hydrology of Lesotho.

Based on the last five years of record, annual rainfall maps were worked out by the Officer and the mean precipitation found for each of the more than thirty catchments in Lesotho. The amount of precipitation was then related to the actual measured runoff, and hence an estimate of the runoff coefficient was achieved on a regional basis. Furthermore, the Officer has devoted some time to look into the useful concept of the relationship between annual runoff and the size of the contributing catchment, again carried out for the last five years of record.

Other topics of this kind which the Officer could take up in the coming months when time allows, are the development of unit hydrographs for a few catchments in Lesotho, annual peak flow analysis, etc.

Sediment sampling and analysis:

As it is known the erosion, sediment transport, and deposition of silt and sand is an important factor in the planning of agricultural projects and the design of hydraulic structures, it was decided to initiate a sediment sampling and analysis program. The Officer was put in charge of the organization of this programme which initially runs on a rather small scale. The first sediment samples were taken in early August. Samples are taken regularly from one station south of Maseru, which represents a major lowland area, whereas spot samples are taken from 10 other stations from different parts of the country.

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Because of somewhat inadequate laboratory facilities, only concentration analyses are carried out on samples brought in from the field. However, this is also the most important characteristic since the concentration of suspended sediment directly leads to an estimate of the sediment load, i.e. the rate at which the river transports eroded material. Another analysis which should be considered later is grain size distribution analysis of the sediment. The information from such an analysis is an important input in the design phase of desilting structures, and in the estimation of the rate of deposition (volume lost) in proposed reservoirs, to name two examples.

In connection with the introduction of the sediment sampling and analysis programme, on-the-job training is given to the technical staff concerned both in the field and laboratory techniques applied.

Recently the Officer has organized a series of partially processed sediment data from 1970-72, filed in the office. From them a sediment load / water discharge relationship for a typical lowland and mountain catchment has been obtained. In the near future an estimate of the mean annual yield of sediment for each type of catchment area will be computed and compared.

In a sense the renewed sediment sampling and analysis programme can be considered as a follow up to the short term programme which abruptly terminated in late 1972.



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PERSONNEL

POST NO.	POST DESCRIPTION	NAME OF INCUMBENT (AND NATIONALITY)	ARRIVED (MO/YR)		DEPARTED (MO/YR)	
			SCHED.	ACTUAL (EST.)	SCHED.	ACTUAL (EST.)
	Assistant Hydrologist (Associate Expert) Post code: LES-150-097-V	SVEN JACOBI (Danish)	3/76	3/76	3/77	3/78

REMARKS: