

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF COMMUNICATION, TRANSPORT,
POST AND CONSTRUCTION
LAO PEOPLE'S DEMOCRATIC REPUBLIC

THE FEASIBILITY STUDY
ON
THE CONSTRUCTION OF THE MEKONG BRIDGE AT PAKSE
IN
THE LAO PEOPLE'S DEMOCRATIC REPUBLIC

FINAL REPORT

VOLUME II
ANNEXES

JUNE 1996

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CONSTRUCTION PROJECT CONSULTANTS, INC.

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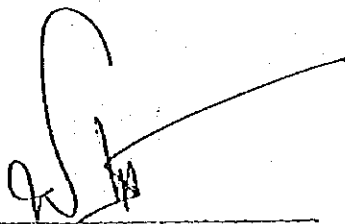
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1. INTRODUCTION

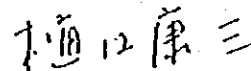
Note A.1-1 Scope of Work for the Feasibility Study on Construction of the Mekong Bridge at Pakse in the Lao People's Democratic Republic
-- 6th April, 1995

SCOPE OF WORK
FOR
THE FEASIBILITY STUDY
ON
CONSTRUCTION OF MEKONG BRIDGE AT PAKSE
IN
THE LAO PEOPLE'S DEMOCRATIC REPUBLIC
AGREED UPON BETWEEN
MINISTRY OF COMMUNICATION, TRANSPORT, POST AND CONSTRUCTION
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

Dated the 6th of April 1995



Phetsamone VIRAPHANTH
Deputy Director of Cabinet
Ministry of Communication,
Transport, Post and Construction



Kozo HIGUCHI
Leader
Preparatory Study Team
Japan International
Cooperation Agency

A. INTRODUCTION

In response to a request of the Government of Lao People's Democratic Republic (hereinafter referred to as "the Government of Lao PDR"), the Government of Japan decided to conduct Feasibility Study on Construction of Mekong Bridge at Pakse (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

Accordingly, Japan International Cooperation Agency (hereinafter referred to as "JICA "), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, will undertake the Study, in close cooperation with the authorities concerned of the Government of Lao PDR.

Ministry of Communication, Transport, Post and Construction (hereinafter referred to as "MCTPC") shall act as the counterpart agency to the Japanese study team and also act as the coordinating body with other relevant organizations for the smooth implementation of the study, on behalf of the Government of Lao PDR.

This document sets forth the Scope of Work for the Study.

B. OBJECTIVES OF THE STUDY

The objective of the Study is :

to conduct feasibility study for the construction project of Mekong Bridge at Pakse including its approaches for the period up to the year of 2010.

C. SCOPE OF THE STUDY

To achieve the objectives mentioned above, the Study shall cover the following items:

1. Data collection and analysis:
 - (1) Socio-economic data
 - (2) Traffic and transport data
 - (3) Soil and geological data
 - (4) Climatic and seismic data

- (5) Hydrological data
- (6) Topographic data
- (7) Development plans
- (8) Others

2. Site survey;

- (1) Traffic survey
- (2) Existing bridge inspection
- (3) Topographic survey
- (4) Soil and geological survey
- (5) Hydrological survey
- (6) Land use survey
- (7) Other necessary survey

3. Traffic forecast;

- (1) Forecast of future socio-economic framework
- (2) Forecast of future traffic demand

4. Comparative study of alternatives;

- (1) Study on the construction of the bridge and approaches (routes, location, bridge type and others)

5. Evaluation of alternatives;

6. Preliminary design;

- (1) Design criteria
- (2) Bridge design
- (3) Approach roads design
- (4) Quantity Estimate

7. Planning and scheduling of construction works;

8. Maintenance program;

9. Cost estimate;

10. Environmental impact assessment (EIA);

- (1) Socio-economic environment
- (2) Natural environment

11. Economic and financial evaluation;

- (1) Economic and financial analysis

12. Implementation program; and

13. Conclusions and recommendations.

W

(1.3)

D. STUDY SCHEDULE

The Study shall be conducted in accordance with the attached tentative schedule.

E. REPORTS.

JICA shall prepare the following reports in English and submit them to the Government of Lao PDR:

1. Inception Report
Thirty (30) copies
At the commencement of the Study;
2. Progress Report
Thirty (30) copies
Within three (3) months after the commencement of the Study;
3. Interim Report
Fifty (50) copies
Within six (6) months after the commencement of the Study;
4. Draft Final Report
Fifty (50) copies
Within nine (9) months after the commencement of the Study;

The written comments on the Draft Final Report from the Government of Lao PDR shall be delivered to JICA within one (1) month after submission of the draft final report.

5. Final Report
Fifty (50) copies
Within two (2) months after the receipt of the written comments on the Draft Final Report from the Government of Lao PDR.

F. UNDERTAKINGS OF THE GOVERNMENT OF LAO PDR

1. To facilitate the smooth conduct of the Study, the Government of Lao PDR shall take necessary measures:

(1) to secure the safety of the Japanese Study Team (hereinafter referred to as "the Team");

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- (2) to permit the members of the Team to enter, leave and sojourn in Lao PDR for the duration of their assignments therein, and exempt them from foreign registration requirements and consular fees;
 - (3) to exempt the members of the Team from taxes, duties and any other charges on equipment, machinery and other material brought into Lao PDR for the conduct of the Study;
 - (4) to exempt the members of the Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Team for their services in connection with the implementation of the Study;
 - (5) to provide necessary facilities to the Team for the remittance as well as utilization of the funds introduced into Lao PDR from Japan in connection with the implementation of the Study;
 - (6) to secure permission for the Team for entry into private properties or restricted areas for the conduct of the Study;
 - (7) to secure permission for the Team to take all data and documents (including maps and photographs) related to the Study out of Lao PDR to Japan; and
 - (8) to provide the medical services as needed, while its expenses will be chargeable on members of the Team;
2. The Government of Lao PDR shall bear claims, if any arises, against the members of the Team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Team.
3. MCTPC shall, at its own expenses, provide the Team with the following in cooperation with relevant organizations :
- (1) available data (including maps) and information related to the Study;
 - (2) counterpart personnel;
 - (3) suitable office space in Vientiane and Pakse;
 - (4) credentials or identification cards;

G. UNDERTAKINGS OF JICA

For the implementation of the Study, JICA shall take the following measures:

aw

Handwritten signature or initials in a circle.

1. to dispatch, at its own expense, the Team to Lao PDR; and
2. to pursue technology transfer to the Lao counterpart personnel in the course of the Study.

H. OTHERS

JICA and MCTPC shall consult with each other in respect of any matter that may arise from or in connection with the Study.

as

TENTATIVE SCHEDULE

| Month | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---------------------|---------------|---|---|----------------|---|---------------|---|---|---------------|----|--------------|
| Work in Lao PDR | | | | | | | | | | | |
| Work in Japan | | | | | | | | | | | |
| Report Presentation | Δ IC/R | | | Δ PR /R | | Δ IT/R | | | Δ DF/R | | Δ F/R |

IC/R: Inception Report
 PR/R: Progress Report
 IT/R: Interim Report
 DF/R: Draft Final Draft
 F/R: Final Report

Note A.1-2 Minutes of Meetings Regarding the Scope of Work
- 6th April, 1995

APPENDIX: (II) MINUTES OF MEETINGS

REGARDING THE SCOPE OF WORK

FOR

THE FEASIBILITY STUDY

ON

CONSTRUCTION OF MEKONG BRIDGE AT PAKSE

IN

THE LAO PEOPLE'S DEMOCRATIC REPUBLIC

AGREED UPON BETWEEN

MINISTRY OF COMMUNICATION, TRANSPORT, POST AND CONSTRUCTION

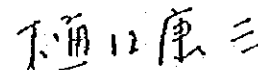
AND

JAPAN INTERNATIONAL COOPERATION AGENCY

Dated the 6th of April 1995



Math SOUNMALA
Director
Department of communication
Ministry of communication,
Transport, Post and Construction



Kozo HIGUCHI
Leader
Preparatory Study Team
Japan International
Cooperation Agency

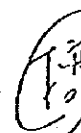
In response to the request of the Government of Lao People's Democratic Republic, the Preparatory Study Team of Japan International Cooperation Agency (JICA) visited Lao PDR from March 28 to April 6, 1995, to agree on the Scope of Work for the Feasibility Study on construction of Mekong bridge at Pakse in the Lao PDR (herein after referred to as "the Study").

The preparatory study team headed by Mr. Kozo HIGUCHI carried out the field reconnaissance survey on the Study area and held a series of discussion on the Scope of Work (S/W) with the officials of Lao side headed by Mr. Math SOUNMALA and Mr. Phetsamone VIRAPHANTH.

The final meeting was held on April 5, 1995 at the office of Ministry of Communication, Transport, Post and Construction. The list of attendants is shown in Appendix. Both Japanese and Lao sides agreed on the Scope of Work.

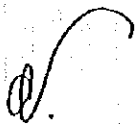
The main issues which were confirmed are as follows:

1. Lao side requested strongly to receive grant aid from Japan. Japanese side promised the request is going to be conveyed to Tokyo. And both sides confirmed that smooth conduct and success of this feasibility study leads to the grant aid. So, Japanese side requested that Lao side should give facilities to the full scale mission as much as possible. And Lao side agreed on this.
2. There is a possibility that necessary equipment for geological survey have to be carried into the study site from Thailand. Japanese side requested that in such a case Lao side should give the full scale mission facilities. And Lao side agreed on this.
3. Both sides agreed that in order to recovery a part of maintenance cost, the full scale mission should analyze the possibility of Pakse bridge be a toll road bridge.
4. Lao side requested to accept a trainee in the training program in Japanese as a part of technology transfer. Japanese side agreed to convey the request to JICA Tokyo.



5. Japanese side requested that vehicles with drivers should be provided by Lao side. However, because of budget constraining, Lao side requested that cars and drivers should be rent by full scale mission at its own expenses. Japanese side agreed to convey the request to JICA Tokyo.

6. Japanese side requested two office spaces for the full scale mission in Vientiane and Pakse. Lao side agreed to provide them. However, because of budget constraining, Lao side requested that the equipment is provided by full scale mission at its own expenses. Japanese side agreed to convey the request to JICA Tokyo.



APPENDIX

LIST of ATTENDANTS

Ministry of Communication, Transport, Post and Construction

| | |
|--------------------------|--|
| Math SOUNMALA | Director, Department of Communication. |
| Phetsamone VIRAPHANTH | Deputy Director of Cabinet. |
| Khangveun KHAMVONGSA | Director, International Relations Division, Office of the Permanent Secretary. |
| Khamseng SAYAKONE | Deputy Director, Department of Communication. |
| Chansy NOUNMALY | Deputy Director, International Relations Division, Office of the Permanent Secretary. |
| Bounthavy KOUMALASY | Technical Control Section Chief, Department of Communication. |
| Somsana RATSAPHONG | Technical Control Section, Department of Communication. |
| Soukhaseum PAKDIMANIVONG | Project Coordinate ADB, Department of Communication, Construction Division. |


Preparatory Study Team

Kozo HIGUCHI Team Leader

Seiichi SAITO

Haruyuki SHIMADA

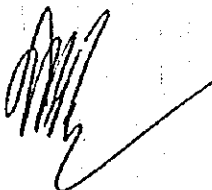
Masashi OSHITARI



Note A.1-3 Minutes of Meeting on the Inception Report for the Feasibility Study
- 10 August, 1995

MINUTES OF MEETING
ON
THE INCEPTION REPORT
FOR
THE FEASIBILITY STUDY
ON
THE CONSTRUCTION OF THE MEKONG BRIDGE AT PAKSE
IN
THE LAO PEOPLE'S DEMOCRATIC REPUBLIC
AGREED UPON BETWEEN
MINISTRY OF COMMUNICATION, TRANSPORT, POST AND CONSTRUCTION
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

VIENTIANE, AUGUST 10, 1995



DR. KHAMSENG SAYAKONE
DEPUTY DIRECTOR
DEPARTMENT OF COMMUNICATION
MINISTRY OF COMMUNICATION,
TRANSPORT, POST AND CONSTRUCTION

其 榮 純 治
MR. JUNJI MASHIBA
LEADER OF STUDY TEAM
JAPAN INTERNATIONAL
COOPERATION AGENCY

MINUTES OF MEETING

In compliance with the Scope of Works (hereinafter referred to as S/W) agreed upon on April 6, 1995 between Japan International Cooperation Agency (hereinafter referred to as JICA) and the Ministry of Communication, Transportation, Post and Construction (hereinafter referred to as MCTPC), the Inception Report for the Feasibility Study on the Construction of Mekong Bridge at Pakse in the Lao People's Democratic Republic (hereinafter referred to as The Study) was submitted by the Study Team to the Director of Communication Department, MCTPC on July 18, 1995, wherein Mr. Junji Mashiba, Leader of the Study Team along with other members of the Study Team conducted a briefing of the Report during the first inception meeting held on the same day, July 18, 1995.

After a series of discussions between the Study Team and the MCTPC officers concerned with the project for the Construction of Mekong Bridge at Pakse, the following subjects were confirmed and agreed upon by both the MCTPC and the Study Team.

1. Submission of the Inception Report

The Study Team submitted 30 copies of the Inception Report on July 18, 1995 to MCTPC in accordance with S/W for the Study. MCTPC acknowledged the receipt of the report and agreed to contents therein.

2. Fundamental Matters for Bridge and Road Design

1) Applicable Standards

As for the Standards for bridge and road design the Japanese Standards and the Lao Standards compiled by MCTPC in 1994 will be mainly applied to this Project.

2) Live loads

For the live loads for bridge design HS-25-44 (AASHTO) or equivalent will be applied.

3) Cross Section Element

(1) Bridge

| | |
|----------------------------|---|
| Number of lane | : 2 lanes |
| Lane width | : 3.5 m per lane |
| Side strip for carriageway | : 0.5 m at each side |
| Sidewalk width | : 1.5 m at each side including safety barrier space |

(2) Approach Roads

| | |
|----------------|-----------------------|
| Number of lane | : 2 lanes |
| Lane width | : 3.50 m per lane |
| Shoulder | : 2.00 m at each side |

Typical cross sections for bridge and approach roads are shown in attached ANNEX - I.

4) Navigation Clearance under bridge girder

Navigation clearance under bridge girder will be secured for ship traffic in the Mekong River around the Project site as follows.

(1) Vertical navigation clearance

| | |
|--|-----------|
| For 2 spans around the longitudinal center of bridge | : 10.00 m |
| For the side spans excluding extreme side spans | : 5.50 m |

These clearance shall be measured on H.W.L. of the River.

(2) Horizontal navigation clearance

| | |
|--|-----------|
| For all spans excluding extreme side spans | : 60.00 m |
|--|-----------|

The above dimensions are illustrated in attached Annex.

5) Bridge route selection

The proposed bridge route will be selected at a location closer to Pakse Town but not to pass through Pakse Town from the point of view of road network efficiency in and around the Project site.

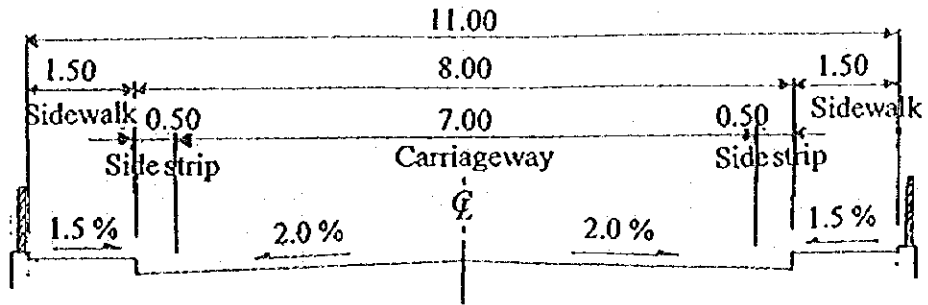
3. The Lao side requested that the Japanese side include the space to install a future railway facility in the proposed bridge design. The Japanese side explained to the Lao side that, if the railway project were taken into consideration in the Study, the Study would not be conducted smoothly since this Study Team has already been established and organized officially and is comprized of neccessary road transportation specialists (excluding railway matters) to execute the feasibility study of the Mekong River bridge at Pakse connecting national roads No. 13 and No.10.

4. The Lao side strongly requested the Japanese side to implement this Project under the Japanese grant aid facility. The Japanese side promised to convey the request to the Government of Japan.

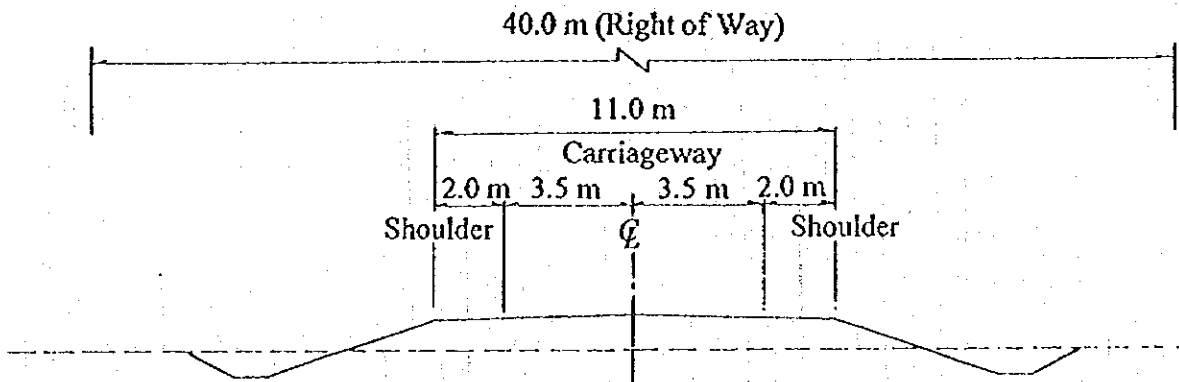
5. In accordance with the Minutes of Meeting on the scope of work, signed on April 6, 1995, in which the Lao side requested the Japanese side to receive a Lao counterpart for the training program in Japan, JICA agreed to accept one Lao trainee. The Japanese side requested the Lao side to select a candidate as soon as possible.

The Attendants in this Meeting are listed in attached ANNEX - II.

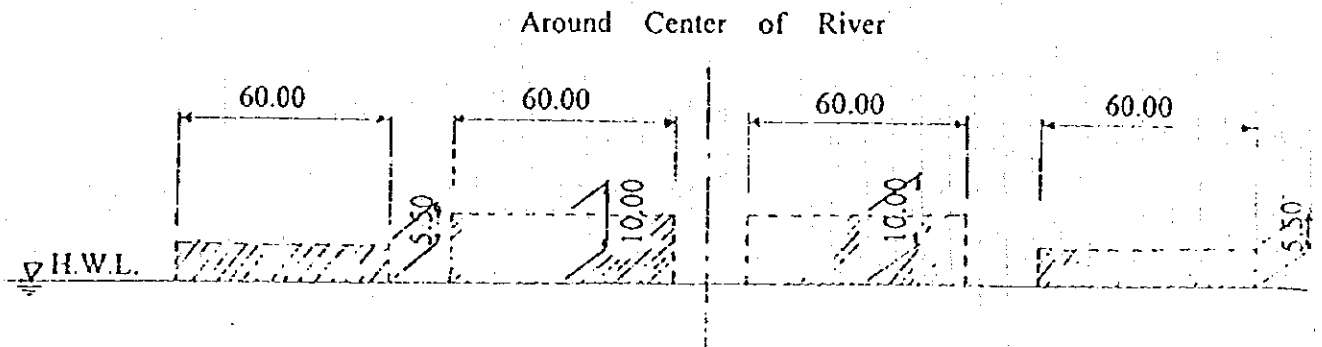
ANNEX-I



TYPICAL CROSS SECTION FOR BRIDGE



TYPICAL CROSS SECTION FOR ROADS



NAVIGATION CLEARANCE

RAA

ANNEX - II

LIST OF ATTENDANTS

Ministry of Communication, Transport, Post and Construction

| | |
|----------------------------|---|
| Dr. Khamseng SAYAKONE | Deputy Director, Communication Department |
| Mr. Bounchanh SINTHAVONG | Deputy Director, Communication Department |
| Mr. Lattanamany KHOUNYVONG | Deputy Director, Cabinet |
| Mr. Khanageun KHAMVONGSA | Director, International Relations Division Office of the Permanent Secretary |
| Mr. Oulay PHADOUANGDETH | Acting Director, Technical Division |
| Mr. Say VIXAYXONGDETH | Director, Inland Waterway Division |
| Mr. Dapkeo DOUANGACHANH | Senior Engineer, Technical Engineer |
| Mr. Khamphay SIRIPHONE | Civil Engineer, Technical Division |

Advisory Team

| | |
|-------------------|--|
| Mr. Kozo HIGUCHI | Team Leader, Honshu-Shikoku Bridge Authority |
| Mr. Seiichi SAITO | Bridge Planner, Ministry of Construction |
| Miss Mari ITO | Coordinator, JICA |

Study Team

| | |
|--------------------|--|
| Mr. Junji MASHIBA | Team Leader, Nippon Koei Co., Ltd. |
| Mr. Kenji Nagasaki | Deputy Team Leader, Construction Project Consultants, Inc. |
| Mr. Masahito HOMMA | Economist, Nippon Koei Co., Ltd. |
| Mr. Akio MORIKAWA | Traffic Engineer, Nippon Koei Co., Ltd. |
| Mr. Keishi IHARA | Highway Engineer, Construction Project Consultants, Inc. |

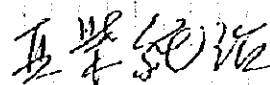
Note A.1-4 Minutes of Meeting on the Interim Report
- 15 December, 1995

MINUTES OF MEETING
ON
THE INTERIM REPORT
FOR
THE FEASIBILITY STUDY
ON
THE CONSTRUCTION OF THE MEKONG BRIDGE AT PAKSE
IN
THE LAO PEOPLE'S DEMOCRATIC REPUBLIC
AGREED UPON BETWEEN
MINISTRY OF COMMUNICATION, TRANSPORT, POST AND CONSTRUCTION
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

Vientiane, December 15, 1995

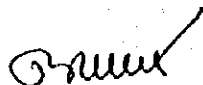


Mr. Somad PHOLESENA
Acting Director
Department of Communication
Ministry of Communication,
Transport, Post and Construction

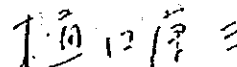


Mr. Junji MASHIBA
Leader
JICA Study Team

Witnessed by



Mr. Bounchanh SINTHAVONG
Deputy Director
Department of Communication
Ministry of Communication,
Transport, Post and Construction



Mr. Kozo HIGUCHI
Chairman
JICA Advisory Committee

MINUTES OF MEETING

In compliance with the Scope of Works (hereinafter referred to as S/W) agreed upon on April 6, 1995 between Japan International Cooperation Agency (hereinafter referred to as JICA) and the Ministry of Communication, Transportation, Post and Construction (hereinafter referred to as MCTPC) and the Inception Report submitted by the Study Team to MCTPC on July 18, 1995, the Interim Report for the Feasibility Study on the Construction of Mekong Bridge at Pakse in the Lao People's Democratic Republic (hereinafter referred to as The Study) was submitted by the Study Team to the Director of Communication Department, MCTPC on December 14, 1995, wherein Mr. Junji Mashiba, Leader of the Study Team, along with other members of the Study Team conducted a briefing of the Report.

After a series of discussions between the Study Team and the MCTPC officers concerned with the project for the Construction of Mekong Bridge at Pakse, the following subjects were confirmed and agreed upon by both the MCTPC and the Study Team.

1. Submission of the Interim Report
 - 1) The Study Team submitted 50 copies of the Interim Report on December 14, 1995 to MCTPC. MCTPC acknowledged the receipt of the report.
 - 2) The Study Team explained the Interim Report and subsequently discussed about the optimal bridge route. Finally, all attendants agreed upon to select the Route-B among the alternatives as the optimal bridge route, which was proposed in the Interim Report.
 - 3) The study Team also addressed that the Report contains the preliminary cost estimation on the land acquisition and compensation, administration and future maintenance for this Project.
2. The Lao side strongly requested the Japanese side to implement this Project under the Japanese grant aid facility. The Japanese side promised to convey the request to the Government of Japan.

LIST OF ATTENDANTS

Ministry of Communication, Transport, Post and Construction

| | |
|---------------------------|---|
| Mr. Somad PHOLESENA | Acting Director, Communication Department |
| Mr. Math Soumala | Deputy Director, Cabinet |
| Mr. Phetsamone VIRAPHANTH | Deputy Director, Cabinet |
| Mr. Bounchanh SINTHAVONG | Deputy Director, Communication Department |
| Dr. Koung SOUK ALOUN | Deputy Director, CTPC of Champasack Province |
| Mr. Khan Ngeun KHAMVONGSA | Director, International Relations Division Office of the Permanent Secretary |
| Mr. Khamla SAYAVONGSA | Head, Administration Division |
| Mr. Oulay PHADOUANGDETH | Head, Technical Division |
| Mr. Dapkeo DOUANGACHANH | Senior Engineer, Technical Division |

JICA Advisory Committee

| | |
|-------------------|---|
| Mr. Kozo HIGUCHI | Chairman, Honshu-Shikoku Bridge Authority |
| Mr. Seiichi SAITO | Bridge Planner, Ministry of Construction |
| Miss Mari ITO | Coordinator, JICA |

JICA Study Team

| | |
|--------------------|--|
| Mr. Junji MASHIBA | Team Leader, Nippon Koei Co., Ltd. |
| Mr. Masahito HOMMA | Economist, Nippon Koei Co., Ltd. |
| Mr. Takao SAKAMOTO | Bridge Engineer, Construction Project Consultants, Inc. |
| Mr. Keishi IHARA | Highway Engineer, Construction Project Consultants, Inc. |
| Mr. Seiji IKEDA | Geologist, Nippon Koei Co., Ltd. |

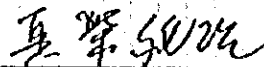
Note A.1-5 Minutes of Meeting on the Draft Final Report
-- 26 March, 1996

MINUTES OF MEETING
ON
THE DRAFT FINAL REPORT
FOR
THE FEASIBILITY STUDY
ON
THE CONSTRUCTION OF THE MEKONG BRIDGE AT PAKSE
IN
THE LAO PEOPLE'S DEMOCRATIC REPUBLIC
AGREED UPON BETWEEN
MINISTRY OF COMMUNICATION, TRANSPORT, POST AND CONSTRUCTION
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

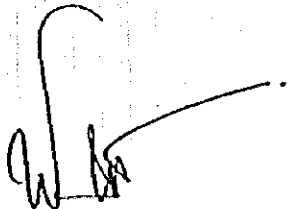
Vientiane, March 26, 1996



Mr. Sommad PHOLSENA
Acting Director
Department of Communication
Ministry of Communication,
Transport, Post and Construction

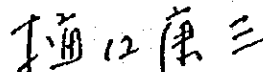


Mr. Junji MASHIBA
Leader
JICA Study Team

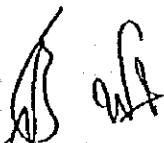


Mr. Phetsamone VIRAPHANTH
Deputy Director of Cabinet
Ministry of Communication,
Transport, Post and Construction

Witnessed by



Mr. Kozo HIGUCHI
Chairman
JICA Advisory Committee



MINUTES OF MEETING

In compliance with Scope of Works agreed upon on April 6, 1995 between the Japan International Cooperation Agency (hereinafter referred to as JICA) and the Ministry of Communication, Transportation, Post and Construction (hereinafter referred to as MCTPC) and the Inception Report submitted by the JICA Study Team (hereinafter referred to as the Study Team) to MCTPC on August 10, 1995, the Draft Final Report for the Feasibility Study on the Construction Mekong Bridge at Pakse in the Lao People's Democratic Republic (hereinafter referred to the Study) was submitted by the Study Team to the Director of Communication Department, MCTPC on March 25, 1996, wherein Mr. Junji Mashiba, Leader of the Study Team, along with other members of the Study Team conducted a briefing of the Report in the presence of the JICA Advisory Committee (hereinafter referred to the Advisory Committee) headed by Mr. Kozo Higuchi.

After a series of discussions between the Study Team and the MCTPC officers concerned with the project for the Construction of Mekong Bridge at Pakse, the following subject were confirmed and agreed upon by both MCTPC and the Study Team.

1. Submission of the Draft Final Report
 - 1) The Study Team submitted 50 copies of the Draft Final Report to MCTPC. MCTPC acknowledged the receipt of the report.
 - 2) MCTPC expressed their appreciation to the Advisory Committee and the Study Team for the efforts they made in all stages of the study.
 - 3) The Study Team explained the Draft Final Report and all attendants agreed basically upon the contents of the Draft Final Report.
2. The Final Report
 - 1) The Final Report is scheduled to be submitted by the end of May 1996 to MCTPC after the finalization of the report taking into consideration comments that might be raised by MCTPC. The comments, if any, shall be forwarded to the Study Team by the end of April, 1996.
 - 2) The both sides agreed that the Final Report shall be kept confidential for two years.
3. 1) The Lao side strongly requested the Japanese side to implement this Project under the Japanese grant aid program. The Japanese side promised to convey the request to the Government of Japan.
 - 2) MCTPC expressed their intention to start the examination to secure the sites for the Project for the prompt and appropriate implementation of the project.

LIST OF ATTENDANTS

LAO SIDE

Ministry of Communication, Transport, Post and Construction

| | |
|---------------------------|---|
| Mr. Sommad PHOLSENA | Acting Director, Communication Department |
| Mr. Math SOUNMALA | Deputy Director, Cabinet |
| Mr. Phetsamone VIRAPHANTH | Deputy Director, Cabinet |
| Mr. Khan Ngeun KHAMVONGSA | Director, International Relations Division Office of the Permanent Secretary |
| Mr. Chansy NOUANMALY | Deputy Chief of International Relation |
| Mr. Oulay PHADOUANGDETH | Head, Technical Division |

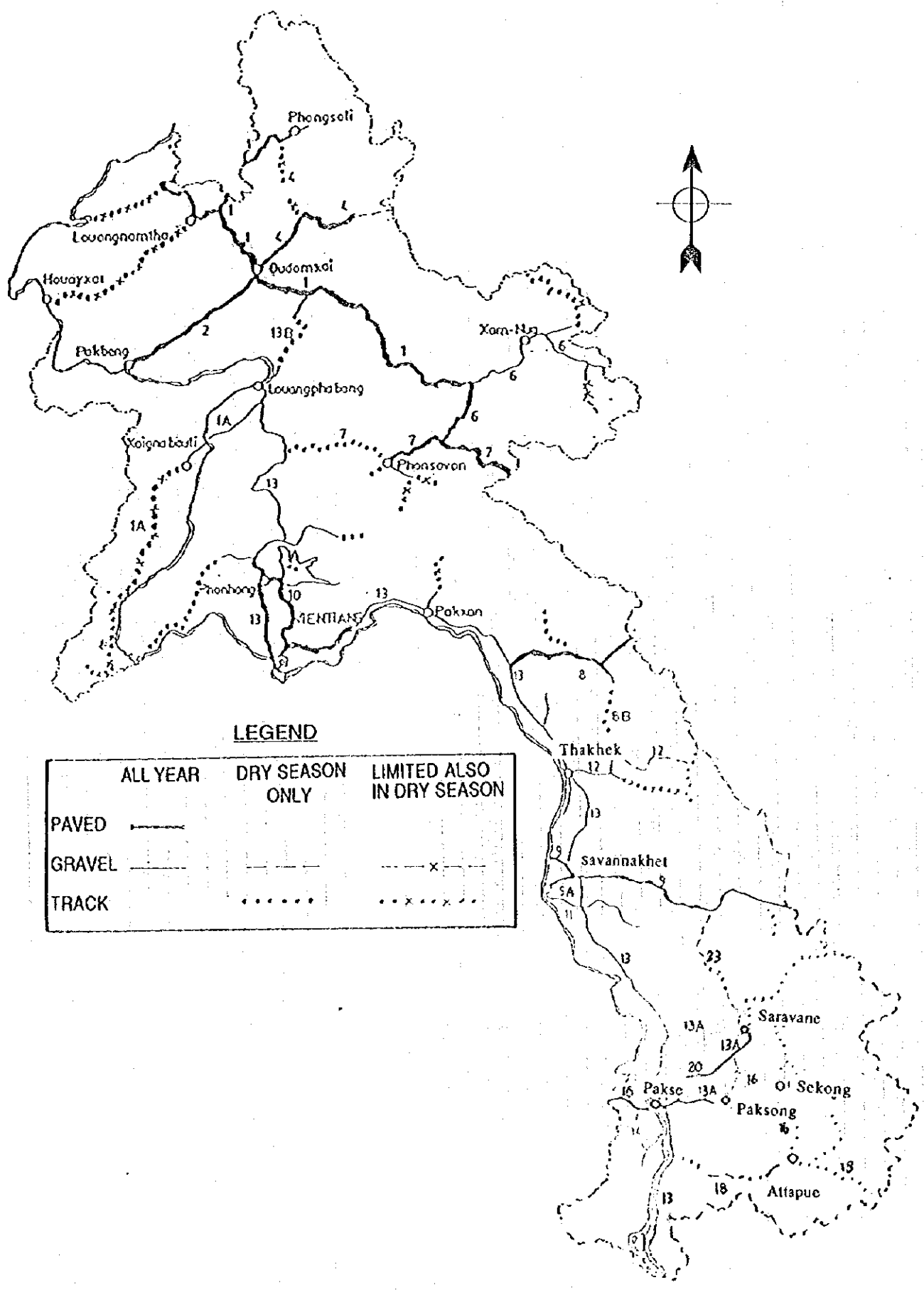
JAPANESE SIDE

JICA Advisory Committee

| | |
|-----------------------|---|
| Mr. Kozo HIGUCHI | Chairman, JICA Advisory Committee |
| Mr. Seiichi SAITO | Bridge Planner, JICA Advisory Committee |
| Mr. Nobuhiko HANAZATO | Cooperation Planner, JICA |
| Miss. Mari ITO | Coordinator, JICA |

JICA Study Team

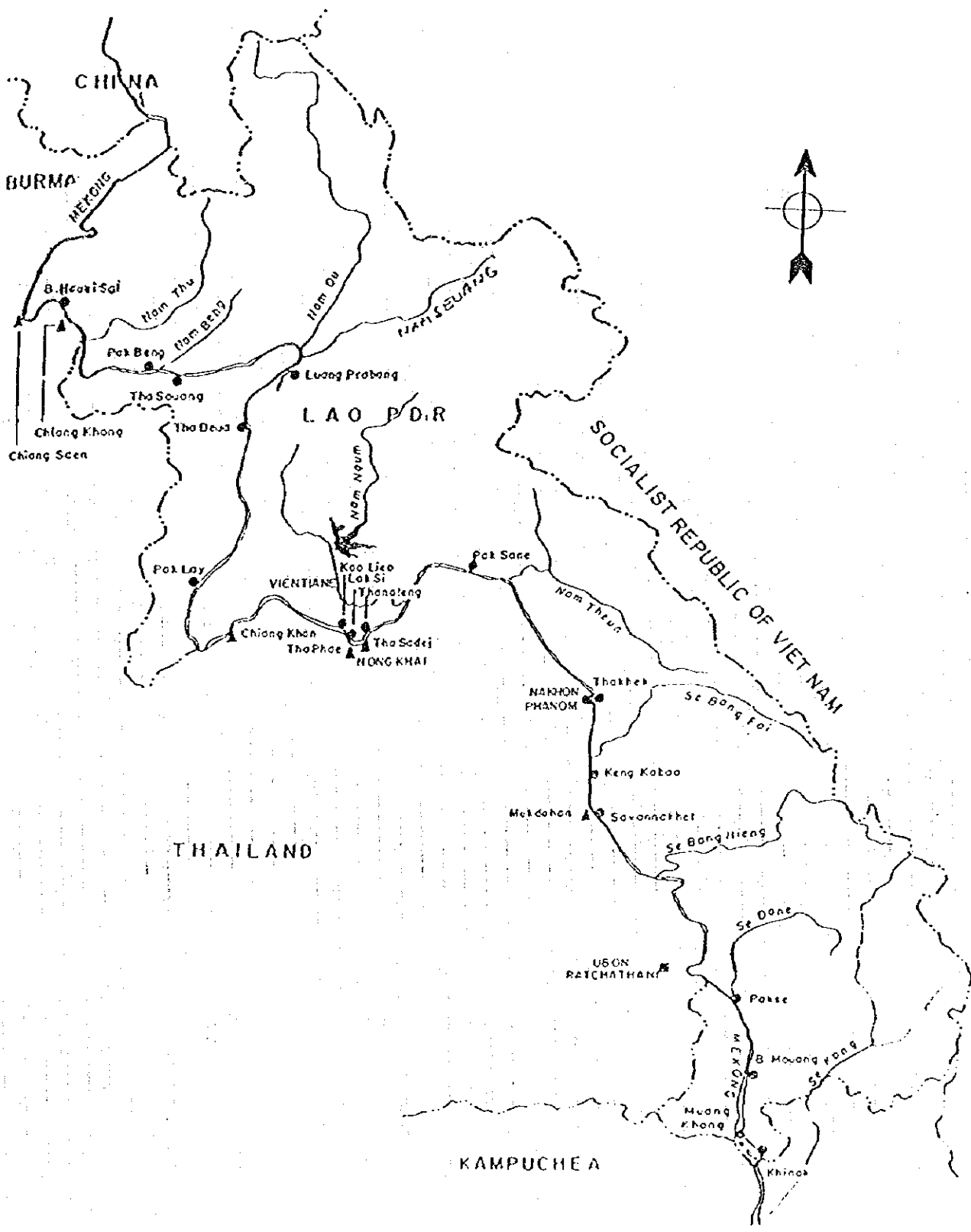
| | |
|--------------------|------------------------------|
| Mr. Junji MASHIBA | Team Leader, JICA Study Team |
| Mr. Masahito HOMMA | Economist, JICA Study Team |



LEGEND

| | ALL YEAR | DRY SEASON ONLY | LIMITED ALSO IN DRY SEASON |
|--------|----------|-----------------|----------------------------|
| PAVED | ————— | ————— | ————— |
| GRAVEL | ————— | ————— | ————— x ————— |
| TRACK | ————— | ————— | ————— x x x x ————— |

FIGURE A.2-1 EXISTING MAIN ROAD CONDITION



0 20 60 100 200
 SCALE KM

- PORTS IN LAO PDR
- ▲ PORTS IN THAILAND

FIGURE A.2-2 LOCATION MAP OF MAJOR PORTS

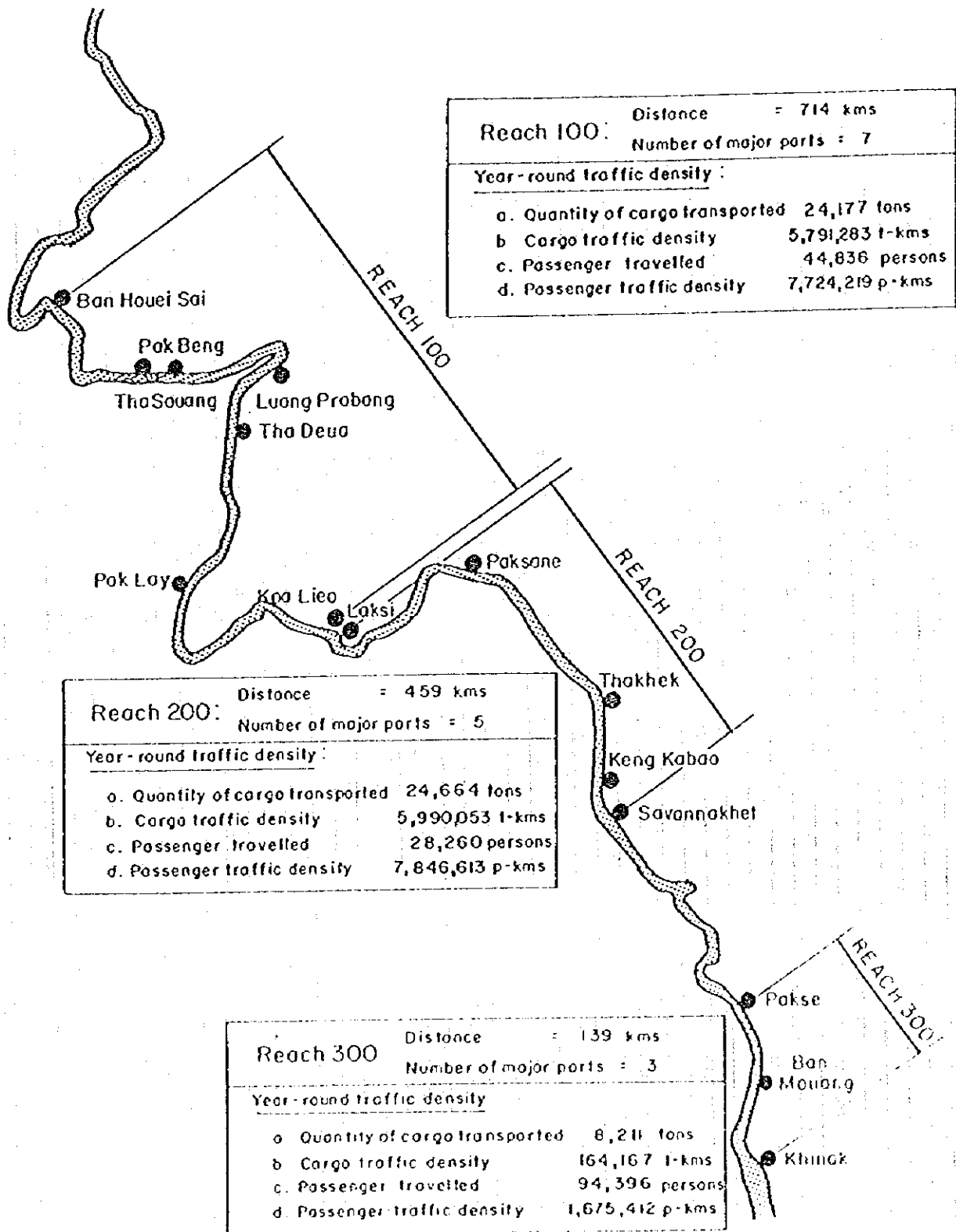
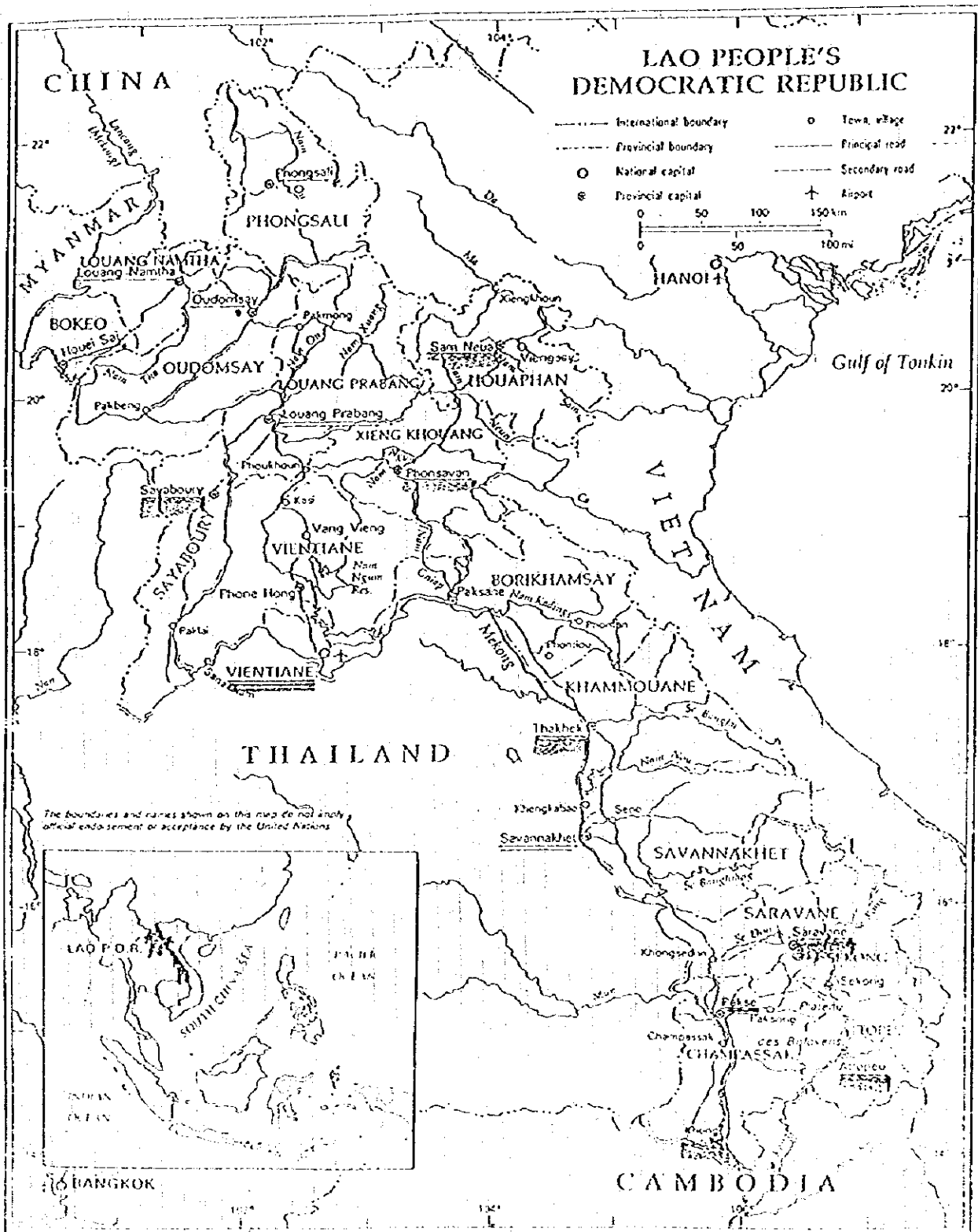


FIGURE A.2-3 RELATIVE TRAFFIC DENSITY OF WATERWAY



LEGEND

- Vientiane International Airport
- Major Domestic Airports
- Minor Domestic Airports

FIGURE A.2-4 LOCATION MAP OF AIRPORTS

TABLE A.3-1 EXTREME MAXIMUM TEMPERATURE AT PAKSE STATION

(Unit: °C)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | MEAN | MAX |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1960 | 35.4 | 35.1 | 37.2 | 38.9 | 37.0 | 33.3 | 34.2 | 31.9 | 32.8 | 32.6 | 33.8 | 32.5 | 34.6 | 38.9 |
| 1961 | 34.0 | 35.9 | 37.7 | 38.3 | 36.1 | 33.1 | 33.0 | 33.4 | 32.2 | 33.0 | 33.6 | 34.5 | 34.6 | 38.3 |
| 1962 | 33.5 | 35.6 | 37.4 | 37.2 | 36.1 | 33.0 | 33.0 | 32.8 | 32.0 | 33.0 | 34.1 | 33.0 | 34.2 | 37.4 |
| 1963 | 33.0 | 34.3 | 37.0 | 37.7 | 37.3 | 33.3 | 33.2 | 32.5 | 32.3 | 32.7 | 33.1 | 32.2 | 34.1 | 37.7 |
| 1964 | 34.6 | 35.8 | 37.4 | 37.8 | 33.7 | 33.2 | 33.5 | 31.7 | 32.6 | 32.9 | 30.7 | 31.2 | 33.8 | 37.8 |
| 1965 | 33.7 | 34.7 | 36.1 | 36.5 | 35.5 | 34.2 | 32.5 | 32.8 | 33.0 | 33.5 | 33.5 | 33.8 | 34.2 | 36.5 |
| 1966 | 34.6 | 36.3 | 36.9 | 36.3 | 34.2 | 33.4 | 33.4 | 31.3 | 31.7 | 34.3 | 33.4 | 34.7 | 34.2 | 36.9 |
| 1967 | 35.0 | 36.5 | 36.5 | 38.1 | 36.5 | 33.1 | 32.4 | 32.0 | 31.8 | 32.5 | 32.5 | 32.0 | 34.1 | 38.1 |
| 1968 | 33.8 | 33.0 | 38.0 | 37.0 | 35.5 | 34.0 | 32.3 | 32.7 | 31.9 | 33.0 | 33.0 | 33.4 | 34.0 | 38.0 |
| 1969 | 34.5 | 35.6 | 37.5 | 37.1 | 36.8 | 33.5 | 33.1 | 32.3 | 32.2 | 33.0 | 32.9 | 33.2 | 34.3 | 37.5 |
| 1970 | 33.1 | 35.9 | 35.5 | 36.0 | 34.9 | 32.8 | 32.2 | 31.0 | 31.1 | 31.5 | 31.3 | 33.8 | 33.3 | 36.0 |
| 1971 | 33.0 | 35.6 | 37.7 | 37.0 | 35.6 | 33.0 | 33.5 | 32.8 | 32.3 | 32.3 | 32.8 | 33.0 | 34.1 | 37.7 |
| 1972 | 34.8 | 34.5 | 35.9 | 35.8 | 37.5 | 34.0 | 32.7 | 32.0 | 32.8 | 33.1 | 33.5 | 32.7 | 34.1 | 37.5 |
| 1973 | 34.3 | 37.2 | 37.5 | 37.5 | 36.7 | 34.8 | 33.8 | 32.4 | 32.7 | 33.6 | 33.5 | 32.9 | 34.7 | 37.5 |
| 1974 | 33.0 | 36.0 | 36.0 | 36.0 | 35.0 | 33.2 | 32.9 | 32.5 | 35.0 | 34.2 | 34.0 | 36.0 | 34.5 | 36.0 |
| 1975 | 36.5 | 35.5 | 35.6 | 37.8 | 36.2 | 31.8 | 33.6 | 32.0 | 33.3 | 32.7 | 33.0 | 34.6 | 34.4 | 37.8 |
| 1976 | 32.0 | 35.6 | 37.0 | 37.1 | 34.6 | 34.0 | 33.2 | 32.0 | 32.6 | 33.0 | 32.4 | 33.5 | 33.9 | 37.1 |
| 1977 | 33.3 | 36.3 | 36.5 | 38.0 | 36.7 | 36.1 | 33.3 | 33.0 | 32.8 | 33.4 | 32.9 | 34.9 | 34.8 | 38.0 |
| 1978 | 35.8 | 34.9 | 37.8 | 37.4 | 36.3 | 34.2 | 33.4 | 32.5 | 32.1 | 32.4 | 32.2 | 32.9 | 34.3 | 37.8 |
| 1979 | 33.4 | 37.3 | 38.3 | 38.6 | 35.1 | 34.3 | 33.9 | 33.2 | 32.7 | 33.9 | 34.3 | 34.4 | 35.0 | 38.6 |
| 1980 | 34.0 | 35.3 | 37.2 | 38.3 | 37.2 | 34.2 | 34.1 | 32.8 | 32.5 | 33.4 | 33.2 | 33.0 | 34.6 | 38.3 |
| 1981 | 34.9 | 36.2 | 38.0 | 38.0 | 35.4 | 32.5 | 32.2 | 33.2 | 33.3 | 33.5 | 33.0 | 32.5 | 34.4 | 38.0 |
| 1982 | 32.1 | 36.8 | 37.7 | 37.5 | 36.0 | 34.0 | 32.9 | 32.2 | 32.4 | 34.2 | 33.7 | 33.7 | 34.4 | 37.7 |
| 1983 | 34.4 | 35.6 | 37.8 | 39.0 | 40.0 | 35.1 | 34.0 | 33.0 | 33.3 | 32.6 | 33.2 | 33.1 | 35.1 | 40.0 |
| 1984 | 33.0 | 35.7 | 38.2 | 38.2 | 34.3 | 33.5 | 33.5 | 31.8 | 32.9 | 32.7 | 33.0 | 33.0 | 34.2 | 38.2 |
| 1985 | 33.7 | 35.9 | 37.4 | 37.8 | 35.0 | 33.5 | 32.8 | 32.0 | 33.5 | 33.9 | 33.5 | 33.5 | 34.4 | 37.8 |
| 1986 | 34.2 | 34.4 | 38.5 | 38.0 | 37.8 | 33.9 | 34.0 | 33.8 | 34.0 | 33.5 | 32.5 | 33.1 | 34.8 | 38.5 |
| 1987 | 33.5 | 35.5 | 37.9 | 38.0 | 37.5 | 35.5 | 34.0 | 33.8 | 34.0 | 35.0 | 34.0 | 33.7 | 35.2 | 38.0 |
| 1988 | 35.8 | 37.0 | 39.5 | 38.6 | 36.0 | 34.5 | 34.2 | 32.1 | 34.0 | 32.0 | 32.8 | 32.0 | 34.9 | 39.5 |
| 1989 | 36.6 | 36.8 | 37.0 | 38.0 | 36.0 | 34.0 | 33.0 | 32.3 | 33.5 | 33.8 | 33.8 | 34.0 | 34.9 | 38.0 |
| 1990 | 35.7 | 35.8 | 37.5 | 40.0 | 38.7 | 32.6 | 33.0 | 33.0 | 33.2 | 34.4 | 33.7 | 33.5 | 35.1 | 40.0 |
| 1991 | 35.2 | 36.5 | 38.1 | 39.0 | 38.5 | 35.6 | 33.5 | 32.5 | 32.8 | 32.8 | 33.5 | 33.4 | 35.1 | 39.0 |
| 1992 | 33.6 | 34.5 | 37.8 | 38.9 | 38.6 | 33.5 | 33.7 | 32.7 | 33.0 | 32.0 | 33.1 | 34.1 | 34.6 | 38.9 |
| 1993 | 34.2 | 35.2 | 38.0 | 37.5 | 37.8 | 35.2 | 33.7 | 33.0 | 32.8 | 33.5 | 33.8 | 34.5 | 34.9 | 38.0 |
| 1994 | 35.2 | 36.8 | 37.1 | 38.0 | 39.1 | 32.7 | 32.2 | 33.4 | 32.4 | 33.0 | 34.7 | 34.4 | 34.9 | 39.1 |
| MEAN | 34.2 | 35.7 | 37.3 | 37.7 | 36.4 | 33.8 | 33.3 | 32.5 | 32.8 | 33.2 | 33.2 | 33.4 | | |
| MAX | 36.6 | 37.3 | 39.5 | 40.0 | 40.0 | 36.1 | 34.2 | 33.8 | 35.0 | 35.0 | 34.7 | 36.0 | | |

Source: Province Meteorology Service - Pakse

TABLE A.3-2 EXTREME MINIMUM TEMPERATURE AT PAKSE STATION

(Unit: °C)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | MEAN | MIN |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1960 | 11.7 | 14.0 | 21.9 | 20.0 | 22.0 | 23.2 | 22.8 | 22.0 | 21.3 | 20.2 | 18.9 | 14.8 | 19.4 | 11.7 |
| 1961 | 11.9 | 15.6 | 21.7 | 22.0 | 23.5 | 22.5 | 22.9 | 23.0 | 22.0 | 20.3 | 18.5 | 15.2 | 19.9 | 11.9 |
| 1962 | 10.4 | 14.5 | 17.0 | 22.0 | 21.1 | 22.9 | 22.8 | 22.5 | 22.8 | 19.0 | 16.5 | 14.3 | 18.8 | 10.4 |
| 1963 | 10.1 | 14.5 | 11.7 | 18.3 | 23.0 | 22.9 | 23.0 | 22.1 | 22.8 | 20.2 | 20.3 | 13.6 | 18.5 | 10.1 |
| 1964 | 17.6 | 14.0 | 18.9 | 22.0 | 23.3 | 22.8 | 22.7 | 22.5 | 22.3 | 21.5 | 16.0 | 13.5 | 19.8 | 13.5 |
| 1965 | 12.0 | 14.5 | 18.6 | 21.9 | 22.9 | 22.0 | 22.0 | 22.5 | 22.3 | 20.3 | 18.0 | 14.9 | 19.3 | 12.0 |
| 1966 | 12.6 | 18.0 | 15.5 | 23.2 | 23.0 | 22.5 | 22.1 | 22.5 | 20.5 | 21.2 | 17.3 | 16.5 | 19.6 | 12.6 |
| 1967 | 11.3 | 14.0 | 15.8 | 20.3 | 22.4 | 22.6 | 22.5 | 22.0 | 22.2 | 17.2 | 17.6 | 13.1 | 18.4 | 11.3 |
| 1968 | 13.5 | 14.5 | 16.5 | 20.6 | 22.1 | 23.0 | 22.7 | 22.5 | 21.6 | 18.2 | 18.3 | 17.3 | 19.2 | 13.5 |
| 1969 | 17.3 | 14.4 | 20.2 | 16.3 | 23.0 | 21.5 | 22.1 | 21.6 | 22.9 | 21.1 | 15.0 | 14.0 | 19.1 | 14.0 |
| 1970 | 14.8 | 15.5 | 20.9 | 18.9 | 21.5 | 21.8 | 22.4 | 20.9 | 22.0 | 19.8 | 16.0 | 16.0 | 19.2 | 14.8 |
| 1971 | 13.2 | 15.5 | 18.0 | 22.3 | 20.5 | 22.0 | 21.5 | 21.5 | 22.3 | 18.0 | 13.2 | 16.0 | 18.7 | 13.2 |
| 1972 | 13.0 | 15.8 | 14.2 | 21.4 | 23.8 | 20.0 | 22.0 | 22.5 | 22.1 | 21.8 | 20.3 | 16.3 | 19.4 | 13.0 |
| 1973 | 16.1 | 17.0 | 22.2 | 24.8 | 23.0 | 23.5 | 23.5 | 22.7 | 22.8 | 19.0 | 16.0 | 12.2 | 20.2 | 12.2 |
| 1974 | 11.0 | 12.5 | 15.2 | 19.6 | 23.2 | 22.5 | 22.4 | 22.0 | 21.3 | 19.5 | 15.9 | 13.0 | 18.2 | 11.0 |
| 1975 | 17.6 | 15.0 | 18.2 | 22.5 | 22.5 | 22.0 | 23.0 | 22.0 | 22.3 | 19.6 | 13.5 | 10.2 | 19.0 | 10.2 |
| 1976 | 11.8 | 15.8 | 17.0 | 20.3 | 22.2 | 22.0 | 22.0 | 22.8 | 23.0 | 22.5 | 14.9 | 13.4 | 19.0 | 11.8 |
| 1977 | 14.4 | 13.8 | 13.9 | 20.0 | 22.9 | 22.2 | 23.4 | 22.3 | 21.3 | 20.1 | 16.0 | 15.3 | 18.8 | 13.8 |
| 1978 | 13.7 | 15.2 | 21.5 | 21.2 | 22.5 | 23.2 | 21.6 | 22.5 | 22.3 | 17.6 | 16.4 | 15.1 | 19.4 | 13.7 |
| 1979 | 17.6 | 16.3 | 21.2 | 21.5 | 22.3 | 22.7 | 21.0 | 22.5 | 22.8 | 18.6 | 15.1 | 14.9 | 19.7 | 14.9 |
| 1980 | 16.0 | 17.0 | 22.8 | 21.2 | 22.5 | 23.6 | 23.0 | 23.0 | 22.5 | 19.7 | 19.0 | 14.0 | 20.4 | 14.0 |
| 1981 | 12.8 | 17.3 | 22.4 | 22.4 | 21.8 | 23.1 | 22.7 | 23.3 | 23.0 | 20.7 | 17.5 | 14.1 | 20.1 | 12.8 |
| 1982 | 14.2 | 17.4 | 23.4 | 20.8 | 20.5 | 22.0 | 22.6 | 22.4 | 22.0 | 20.2 | 18.6 | 11.2 | 19.6 | 11.2 |
| 1983 | 11.4 | 18.4 | 19.1 | 22.3 | 23.3 | 23.2 | 24.4 | 22.8 | 23.2 | 21.2 | 14.2 | 13.3 | 19.7 | 11.4 |
| 1984 | 13.0 | 15.0 | 15.0 | 24.0 | 22.2 | 23.0 | 22.0 | 22.0 | 22.3 | 18.3 | 17.3 | 14.0 | 19.0 | 13.0 |
| 1985 | 16.2 | 17.2 | 18.2 | 20.2 | 22.0 | 23.0 | 21.9 | 21.8 | 22.4 | 19.9 | 19.5 | 13.6 | 19.7 | 13.6 |
| 1986 | 12.8 | 14.5 | 11.8 | 23.2 | 22.5 | 21.5 | 21.4 | 21.5 | 22.0 | 20.7 | 16.0 | 15.0 | 18.6 | 11.8 |
| 1987 | 14.7 | 15.5 | 21.3 | 21.5 | 23.1 | 22.8 | 22.3 | 22.5 | 22.0 | 19.2 | 18.1 | 13.3 | 19.7 | 13.3 |
| 1988 | 14.8 | 17.2 | 18.0 | 21.4 | 23.3 | 22.3 | 23.0 | 21.5 | 22.3 | 19.0 | 16.2 | 14.0 | 19.4 | 14.0 |
| 1989 | 15.2 | 14.5 | 16.5 | 22.3 | 22.0 | 22.2 | 22.4 | 21.8 | 22.8 | 17.6 | 16.5 | 14.6 | 19.0 | 14.5 |
| 1990 | 14.4 | 16.5 | 21.0 | 21.0 | 22.2 | 23.1 | 22.0 | 22.0 | 23.0 | 20.3 | 17.8 | 15.2 | 19.9 | 14.4 |
| 1991 | 16.3 | 15.8 | 22.2 | 19.5 | 22.3 | 23.0 | 23.0 | 23.0 | 22.4 | 17.0 | 16.3 | 16.1 | 19.7 | 15.8 |
| 1992 | 12.1 | 16.9 | 20.1 | 23.5 | 22.8 | 23.1 | 21.8 | 22.1 | 22.0 | 19.6 | 15.1 | 14.8 | 19.5 | 12.1 |
| 1993 | 12.0 | 14.1 | 18.8 | 20.7 | 22.3 | 23.1 | 23.0 | 22.2 | 22.0 | 20.0 | 17.2 | 14.2 | 19.1 | 12.0 |
| 1994 | 13.0 | 19.1 | 18.2 | 23.7 | 22.8 | 23.2 | 23.1 | 22.4 | 21.8 | 16.0 | 17.7 | 16.4 | 19.8 | 13.0 |
| MEAN | 13.7 | 15.6 | 18.5 | 21.3 | 22.5 | 22.6 | 22.5 | 22.3 | 22.2 | 19.6 | 16.9 | 14.4 | | |
| MIN | 10.1 | 12.5 | 11.7 | 16.3 | 20.5 | 20.0 | 21.0 | 20.9 | 20.5 | 16.0 | 13.2 | 10.2 | | |

Source: Province Meteorology Service - Pakse

TABLE A.3-3 AVERAGE OF EXTREME TEMPERATURES AT PAKSE
: (Tmax+Tmin)/2

(Unit: °C)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | MEAN |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1960 | 24.7 | 26.2 | 28.8 | 30.3 | 29.6 | 29.0 | 27.5 | 27.1 | 27.1 | 26.4 | 26.7 | 24.1 | 27.3 |
| 1961 | 23.2 | 27.4 | 29.8 | 29.8 | 28.4 | 26.8 | 27.1 | 27.1 | 26.6 | 26.6 | 26.4 | 25.5 | 27.1 |
| 1962 | 22.9 | 25.0 | 28.5 | 29.5 | 28.8 | 27.6 | 27.3 | 27.1 | 26.9 | 26.9 | 25.9 | 23.7 | 26.7 |
| 1963 | 21.2 | 25.0 | 27.6 | 30.1 | 29.4 | 27.8 | 27.0 | 27.1 | 27.2 | 27.1 | 26.6 | 23.9 | 26.7 |
| 1964 | 26.5 | 26.5 | 29.1 | 30.5 | 27.6 | 27.9 | 27.9 | 26.9 | 26.7 | 27.0 | 24.1 | 23.3 | 27.0 |
| 1965 | 22.8 | 28.1 | 28.3 | 29.6 | 28.7 | 26.9 | 26.9 | 27.1 | 26.6 | 27.3 | 26.0 | 25.6 | 27.0 |
| 1966 | 25.9 | 27.5 | 28.6 | 29.5 | 27.5 | 27.8 | 27.1 | 26.6 | 26.2 | 27.5 | 26.0 | 26.0 | 27.2 |
| 1967 | 23.7 | 25.6 | 28.5 | 29.5 | 28.9 | 28.0 | 26.0 | 27.0 | 26.1 | 25.5 | 25.6 | 23.0 | 26.5 |
| 1968 | 24.1 | 24.9 | 29.2 | 29.2 | 28.7 | 27.7 | 27.6 | 26.6 | 26.6 | 26.1 | 26.2 | 26.2 | 26.9 |
| 1969 | 27.0 | 27.1 | 30.0 | 30.3 | 29.3 | 28.0 | 26.7 | 27.2 | 27.2 | 27.1 | 25.1 | 23.6 | 27.4 |
| 1970 | 24.9 | 27.1 | 29.1 | 28.8 | 28.4 | 26.9 | 26.8 | 25.8 | 26.1 | 25.3 | 24.0 | 25.5 | 26.6 |
| 1971 | 23.8 | 25.9 | 27.9 | 30.5 | 28.5 | 26.5 | 27.1 | 27.0 | 27.4 | 25.7 | 23.8 | 24.3 | 26.5 |
| 1972 | 23.3 | 26.5 | 27.1 | 28.2 | 30.5 | 27.5 | 27.2 | 26.6 | 27.2 | 27.7 | 27.0 | 25.1 | 27.0 |
| 1973 | 25.2 | 28.1 | 29.6 | 31.2 | 29.4 | 28.6 | 28.0 | 27.4 | 27.1 | 26.3 | 24.6 | 23.0 | 27.4 |
| 1974 | 23.6 | 25.8 | 28.2 | 29.0 | 28.7 | 27.8 | 27.7 | 26.8 | 27.3 | 26.2 | 25.7 | 25.4 | 26.9 |
| 1975 | 26.7 | 26.7 | 28.6 | 29.9 | 28.9 | 27.2 | 27.3 | 26.9 | 27.3 | 26.3 | 24.4 | 22.6 | 26.9 |
| 1976 | 22.8 | 26.9 | 28.6 | 29.9 | 28.3 | 28.2 | 27.1 | 27.0 | 27.1 | 27.6 | 24.5 | 24.7 | 26.9 |
| 1977 | 24.4 | 24.6 | 27.9 | 30.1 | 29.8 | 29.3 | 27.9 | 27.4 | 26.8 | 27.6 | 25.5 | 25.2 | 27.2 |
| 1978 | 25.6 | 26.9 | 29.8 | 29.8 | 28.8 | 27.9 | 27.5 | 26.8 | 26.6 | 26.3 | 25.8 | 24.5 | 27.2 |
| 1979 | 26.2 | 27.4 | 30.6 | 30.1 | 28.5 | 27.7 | 27.7 | 27.2 | 27.4 | 26.2 | 25.6 | 24.8 | 27.5 |
| 1980 | 25.2 | 27.2 | 30.2 | 30.8 | 29.4 | 28.1 | 27.8 | 27.7 | 27.0 | 27.3 | 25.8 | 24.6 | 27.6 |
| 1981 | 24.1 | 27.5 | 30.3 | 30.2 | 28.5 | 27.5 | 26.7 | 27.4 | 28.1 | 27.0 | 26.5 | 23.2 | 27.3 |
| 1982 | 23.6 | 27.6 | 30.2 | 29.2 | 29.3 | 28.0 | 27.5 | 27.1 | 26.5 | 27.2 | 27.2 | 23.2 | 27.2 |
| 1983 | 24.4 | 28.0 | 30.0 | 32.2 | 30.7 | 28.7 | 28.4 | 27.7 | 28.1 | 27.0 | 24.8 | 23.5 | 27.8 |
| 1984 | 24.0 | 26.9 | 29.2 | 30.5 | 28.5 | 27.7 | 27.4 | 26.1 | 26.7 | 26.3 | 25.4 | 24.4 | 26.9 |
| 1985 | 24.8 | 28.5 | 29.1 | 29.7 | 28.5 | 27.4 | 27.4 | 27.0 | 27.3 | 27.3 | 27.2 | 24.3 | 27.4 |
| 1986 | 23.5 | 26.4 | 28.6 | 30.9 | 28.5 | 28.1 | 27.3 | 27.2 | 27.4 | 27.3 | 24.8 | 24.4 | 27.0 |
| 1987 | 24.8 | 26.9 | 30.3 | 30.7 | 30.2 | 28.4 | 26.8 | 28.6 | 27.9 | 28.1 | 27.2 | 23.0 | 27.7 |
| 1988 | 26.3 | 28.4 | 30.1 | 30.4 | 29.3 | 28.1 | 28.2 | 27.3 | 28.1 | 25.8 | 24.5 | 23.4 | 27.5 |
| 1989 | 26.1 | 26.2 | 28.3 | 30.4 | 28.8 | 28.1 | 27.6 | 27.3 | 27.4 | 26.9 | 26.2 | 24.4 | 27.3 |
| 1990 | 26.2 | 27.9 | 29.0 | 31.1 | 28.8 | 27.8 | 27.4 | 27.6 | 27.6 | 27.1 | 26.0 | 24.8 | 27.6 |
| 1991 | 26.2 | 27.2 | 30.5 | 31.4 | 30.9 | 28.2 | 27.5 | 26.9 | 27.4 | 26.5 | 25.2 | 25.0 | 27.7 |
| 1992 | 23.9 | 27.2 | 29.9 | 31.8 | 30.2 | 28.0 | 27.4 | 27.8 | 27.0 | 27.2 | 24.6 | 25.4 | 27.5 |
| 1993 | 24.5 | 26.1 | 29.0 | 30.0 | 29.4 | 28.6 | 28.1 | 27.1 | 27.2 | 27.0 | 26.1 | 24.2 | 27.3 |
| 1994 | 27.2 | 29.3 | 28.8 | 31.0 | 30.0 | 27.4 | 27.4 | 27.3 | 27.2 | 26.6 | 26.5 | 26.3 | 27.9 |
| MEAN | 24.7 | 26.9 | 29.1 | 30.2 | 29.1 | 27.9 | 27.4 | 27.1 | 27.1 | 26.8 | 25.6 | 24.4 | 27.2 |

Source: Province Meteorology Service - Pakse

TABLE A.3-4 MEAN MAXIMUM TEMPERATURE AT PAKSE STATION

(Unit: °C)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | MEAN |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1960 | 31.7 | 32.9 | 33.6 | 35.4 | 34.1 | 30.8 | 30.5 | 29.8 | 30.5 | 30.5 | 31.3 | 29.9 | 31.8 |
| 1961 | 30.1 | 33.3 | 35.0 | 34.7 | 31.9 | 29.7 | 30.1 | 29.8 | 29.5 | 30.4 | 31.5 | 31.2 | 31.4 |
| 1962 | 29.2 | 31.0 | 34.1 | 34.3 | 33.0 | 30.8 | 30.0 | 30.0 | 29.7 | 30.9 | 31.1 | 29.6 | 31.1 |
| 1963 | 27.8 | 31.7 | 33.3 | 34.9 | 33.4 | 30.7 | 29.7 | 29.9 | 29.9 | 31.1 | 31.2 | 30.0 | 31.1 |
| 1964 | 32.5 | 32.8 | 34.6 | 35.3 | 30.7 | 31.0 | 31.2 | 29.5 | 29.7 | 30.8 | 28.4 | 29.3 | 31.3 |
| 1965 | 29.7 | 34.3 | 33.9 | 34.1 | 32.6 | 29.9 | 30.0 | 30.2 | 29.9 | 31.7 | 31.0 | 31.1 | 31.5 |
| 1966 | 32.3 | 33.1 | 33.5 | 33.9 | 30.6 | 31.0 | 30.3 | 29.5 | 29.5 | 31.7 | 30.9 | 31.2 | 31.5 |
| 1967 | 29.3 | 32.1 | 34.3 | 34.3 | 33.0 | 31.3 | 29.0 | 29.8 | 28.6 | 29.7 | 30.8 | 29.0 | 30.9 |
| 1968 | 30.3 | 30.5 | 34.6 | 34.1 | 32.8 | 31.0 | 30.7 | 29.3 | 29.5 | 30.4 | 31.6 | 32.1 | 31.4 |
| 1969 | 32.5 | 32.5 | 35.0 | 34.8 | 33.1 | 31.1 | 29.4 | 30.6 | 30.3 | 30.7 | 29.9 | 29.3 | 31.6 |
| 1970 | 30.7 | 32.6 | 34.1 | 33.4 | 32.0 | 30.1 | 29.8 | 28.7 | 29.0 | 29.0 | 28.5 | 30.7 | 30.7 |
| 1971 | 30.0 | 32.4 | 33.4 | 35.0 | 32.3 | 29.5 | 30.1 | 30.4 | 30.5 | 29.5 | 28.1 | 29.8 | 30.9 |
| 1972 | 29.7 | 31.1 | 32.4 | 32.8 | 34.6 | 30.6 | 30.0 | 29.2 | 30.3 | 31.5 | 31.5 | 30.3 | 31.2 |
| 1973 | 31.1 | 33.7 | 34.5 | 35.4 | 33.2 | 31.7 | 30.7 | 30.5 | 30.6 | 30.4 | 29.1 | 28.7 | 31.6 |
| 1974 | 29.4 | 31.5 | 33.4 | 33.4 | 32.6 | 31.0 | 30.8 | 30.1 | 30.3 | 30.5 | 30.7 | 31.8 | 31.3 |
| 1975 | 32.4 | 32.3 | 33.5 | 34.4 | 32.8 | 30.2 | 30.3 | 29.5 | 30.6 | 29.7 | 29.9 | 27.6 | 31.1 |
| 1976 | 29.5 | 32.4 | 34.1 | 34.7 | 32.2 | 31.3 | 30.2 | 30.1 | 30.1 | 31.5 | 29.4 | 30.6 | 31.3 |
| 1977 | 31.1 | 31.4 | 33.6 | 34.7 | 34.3 | 33.1 | 31.0 | 30.5 | 30.0 | 32.2 | 30.8 | 31.6 | 32.0 |
| 1978 | 31.8 | 32.8 | 34.6 | 34.8 | 32.9 | 31.2 | 30.8 | 29.5 | 29.4 | 30.6 | 31.2 | 30.5 | 31.7 |
| 1979 | 32.2 | 33.0 | 35.6 | 34.6 | 32.4 | 30.7 | 30.9 | 30.3 | 30.7 | 31.3 | 31.2 | 31.3 | 32.0 |
| 1980 | 32.2 | 33.3 | 35.3 | 35.6 | 33.6 | 31.6 | 31.0 | 30.8 | 29.8 | 30.9 | 30.2 | 30.0 | 32.0 |
| 1981 | 30.6 | 33.1 | 35.5 | 34.9 | 32.3 | 30.4 | 29.6 | 30.2 | 31.6 | 30.1 | 30.7 | 28.7 | 31.5 |
| 1982 | 30.3 | 33.5 | 35.1 | 33.7 | 33.3 | 31.4 | 30.4 | 30.0 | 29.4 | 31.6 | 32.3 | 29.4 | 31.7 |
| 1983 | 30.9 | 33.4 | 35.0 | 36.8 | 35.1 | 32.0 | 31.2 | 30.9 | 31.3 | 30.2 | 29.5 | 29.8 | 32.2 |
| 1984 | 30.5 | 32.9 | 34.6 | 34.7 | 32.1 | 30.6 | 30.5 | 28.6 | 29.9 | 30.2 | 29.8 | 30.3 | 31.2 |
| 1985 | 31.6 | 33.7 | 35.0 | 34.2 | 32.5 | 30.3 | 30.7 | 30.1 | 31.0 | 31.7 | 32.2 | 30.3 | 31.9 |
| 1986 | 30.5 | 32.6 | 34.4 | 36.1 | 32.4 | 31.7 | 30.8 | 30.4 | 31.4 | 31.4 | 29.6 | 30.2 | 31.8 |
| 1987 | 31.6 | 33.4 | 35.8 | 35.9 | 34.7 | 32.2 | 29.8 | 32.0 | 31.7 | 32.8 | 31.7 | 29.4 | 32.6 |
| 1988 | 33.3 | 34.5 | 36.2 | 36.0 | 33.6 | 31.7 | 32.1 | 30.9 | 32.2 | 29.4 | 29.7 | 29.8 | 32.5 |
| 1989 | 32.9 | 33.3 | 34.5 | 35.4 | 32.9 | 31.5 | 31.0 | 30.6 | 30.9 | 31.1 | 31.8 | 31.4 | 32.3 |
| 1990 | 33.0 | 33.4 | 34.3 | 36.1 | 32.6 | 31.0 | 30.7 | 30.8 | 31.1 | 30.9 | 30.7 | 31.1 | 32.1 |
| 1991 | 33.3 | 33.6 | 35.9 | 35.6 | 35.7 | 31.6 | 30.7 | 29.8 | 30.6 | 30.4 | 30.9 | 31.3 | 32.5 |
| 1992 | 30.3 | 32.9 | 35.1 | 36.9 | 35.1 | 31.4 | 30.8 | 30.0 | 30.8 | 30.2 | 30.0 | 31.5 | 32.1 |
| 1993 | 31.2 | 32.7 | 34.5 | 35.0 | 33.9 | 32.4 | 31.8 | 30.6 | 31.0 | 31.7 | 31.7 | 30.0 | 32.2 |
| 1994 | 32.6 | 34.7 | 34.8 | 36.4 | 34.2 | 30.4 | 30.3 | 30.4 | 30.5 | 31.0 | 32.4 | 32.0 | 32.5 |
| MEAN | 31.1 | 32.8 | 34.5 | 34.9 | 33.1 | 31.1 | 30.5 | 30.1 | 30.3 | 30.8 | 30.6 | 30.3 | 31.7 |

Source: Province Meteorology Service - Pakse

TABLE A.3-5 MEAN MINIMUM TEMPERATURE AT PAKSE STATION

(Unit: °C)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | MEAN |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1960 | 17.8 | 19.5 | 24.0 | 25.2 | 25.1 | 27.2 | 24.5 | 24.5 | 23.6 | 22.2 | 22.0 | 18.2 | 22.8 |
| 1961 | 16.3 | 21.4 | 24.5 | 24.9 | 24.9 | 23.9 | 24.1 | 24.3 | 23.7 | 22.9 | 22.4 | 19.7 | 22.8 |
| 1962 | 16.6 | 18.9 | 22.9 | 24.6 | 24.6 | 24.9 | 24.5 | 24.1 | 24.1 | 22.9 | 20.6 | 17.7 | 22.2 |
| 1963 | 14.6 | 18.3 | 21.9 | 25.3 | 25.3 | 25.0 | 24.2 | 24.2 | 24.4 | 23.0 | 22.0 | 17.7 | 22.2 |
| 1964 | 20.4 | 20.1 | 23.5 | 25.7 | 24.5 | 24.8 | 24.5 | 24.3 | 23.7 | 23.3 | 19.7 | 17.4 | 22.7 |
| 1965 | 15.9 | 22.0 | 22.8 | 25.1 | 24.9 | 24.0 | 23.9 | 23.9 | 23.3 | 23.0 | 21.0 | 20.1 | 22.5 |
| 1966 | 19.5 | 21.9 | 23.8 | 25.0 | 24.4 | 24.5 | 23.9 | 23.7 | 22.8 | 23.3 | 21.1 | 20.8 | 22.9 |
| 1967 | 18.1 | 19.1 | 22.7 | 24.7 | 24.8 | 24.7 | 24.2 | 24.2 | 23.5 | 21.3 | 20.4 | 16.9 | 22.1 |
| 1968 | 17.8 | 19.3 | 23.8 | 24.2 | 24.5 | 24.4 | 24.5 | 23.9 | 23.6 | 21.9 | 20.8 | 20.2 | 22.4 |
| 1969 | 21.5 | 21.7 | 24.9 | 25.7 | 25.5 | 24.8 | 24.0 | 23.8 | 24.2 | 23.4 | 20.2 | 17.8 | 23.1 |
| 1970 | 19.0 | 21.5 | 24.1 | 24.2 | 24.7 | 23.6 | 23.7 | 22.8 | 23.2 | 21.6 | 19.4 | 20.2 | 22.3 |
| 1971 | 17.5 | 19.4 | 22.4 | 25.1 | 24.7 | 23.6 | 24.0 | 23.6 | 24.2 | 21.9 | 18.8 | 18.7 | 22.0 |
| 1972 | 16.8 | 21.8 | 21.8 | 23.7 | 26.3 | 24.3 | 24.3 | 23.9 | 25.0 | 23.8 | 22.5 | 19.9 | 22.8 |
| 1973 | 19.3 | 22.5 | 24.7 | 27.0 | 25.7 | 25.5 | 25.4 | 24.3 | 24.2 | 22.1 | 20.2 | 17.3 | 23.2 |
| 1974 | 17.7 | 20.2 | 23.0 | 24.6 | 24.9 | 24.7 | 24.7 | 23.5 | 23.3 | 22.2 | 20.7 | 19.0 | 22.4 |
| 1975 | 21.3 | 21.1 | 23.7 | 25.4 | 25.1 | 24.1 | 24.4 | 23.9 | 24.1 | 22.9 | 19.7 | 17.6 | 22.8 |
| 1976 | 16.1 | 21.4 | 23.2 | 25.1 | 24.4 | 25.1 | 24.1 | 23.9 | 24.1 | 23.8 | 17.5 | 18.9 | 22.3 |
| 1977 | 17.8 | 17.8 | 22.2 | 25.5 | 25.3 | 25.5 | 24.8 | 24.3 | 23.6 | 23.1 | 20.3 | 18.8 | 22.4 |
| 1978 | 19.4 | 21.1 | 25.1 | 24.9 | 24.8 | 24.7 | 24.2 | 34.1 | 23.8 | 22.1 | 20.4 | 18.5 | 23.6 |
| 1979 | 20.2 | 21.7 | 25.7 | 25.7 | 24.7 | 24.7 | 24.5 | 24.2 | 24.2 | 21.1 | 19.9 | 18.3 | 22.9 |
| 1980 | 18.2 | 20.9 | 25.2 | 25.9 | 25.3 | 25.0 | 24.7 | 24.7 | 24.2 | 23.6 | 21.4 | 19.2 | 23.2 |
| 1981 | 17.6 | 21.9 | 25.1 | 25.5 | 24.6 | 24.5 | 23.8 | 24.6 | 24.5 | 23.8 | 22.2 | 17.6 | 23.0 |
| 1982 | 16.8 | 21.6 | 25.3 | 24.6 | 25.2 | 24.5 | 24.5 | 24.2 | 23.6 | 22.8 | 22.0 | 16.9 | 22.7 |
| 1983 | 17.8 | 22.5 | 25.0 | 27.5 | 26.2 | 25.4 | 25.5 | 24.5 | 24.8 | 23.7 | 20.0 | 18.5 | 23.5 |
| 1984 | 17.4 | 20.8 | 23.7 | 26.3 | 24.8 | 24.7 | 24.2 | 23.5 | 23.5 | 22.3 | 20.9 | 18.4 | 22.5 |
| 1985 | 18.0 | 23.2 | 23.2 | 25.1 | 24.5 | 24.5 | 24.1 | 23.9 | 23.5 | 22.8 | 22.1 | 18.2 | 22.8 |
| 1986 | 16.4 | 20.1 | 22.9 | 25.6 | 24.6 | 24.5 | 23.7 | 23.9 | 23.5 | 23.2 | 20.1 | 18.6 | 22.3 |
| 1987 | 17.9 | 20.4 | 24.8 | 25.4 | 25.6 | 24.6 | 23.7 | 25.5 | 24.0 | 23.4 | 22.7 | 16.6 | 22.9 |
| 1988 | 19.3 | 22.2 | 24.1 | 24.8 | 25.0 | 24.4 | 24.2 | 23.7 | 24.0 | 22.2 | 19.2 | 17.0 | 22.5 |
| 1989 | 19.2 | 19.0 | 22.0 | 25.4 | 24.6 | 24.6 | 24.1 | 24.0 | 23.9 | 22.6 | 20.6 | 17.3 | 22.3 |
| 1990 | 19.5 | 21.8 | 23.7 | 26.1 | 24.5 | 24.6 | 24.1 | 24.4 | 24.2 | 23.2 | 21.3 | 18.4 | 23.0 |
| 1991 | 19.1 | 20.7 | 25.2 | 25.6 | 26.1 | 24.7 | 24.3 | 24.0 | 24.1 | 22.5 | 19.5 | 18.5 | 22.9 |
| 1992 | 17.5 | 25.1 | 24.8 | 26.6 | 25.2 | 24.5 | 24.0 | 23.9 | 23.7 | 21.6 | 19.2 | 19.4 | 23.0 |
| 1993 | 17.8 | 19.4 | 23.5 | 24.9 | 24.9 | 24.8 | 24.4 | 23.6 | 23.4 | 22.4 | 20.5 | 18.5 | 22.3 |
| 1994 | 21.7 | 23.6 | 22.8 | 25.6 | 25.7 | 24.5 | 24.4 | 24.1 | 23.9 | 22.1 | 20.5 | 20.5 | 23.3 |
| MEAN | 18.2 | 21.0 | 23.8 | 25.3 | 25.0 | 24.7 | 24.3 | 24.3 | 23.9 | 22.7 | 20.6 | 18.5 | 22.7 |

Source: Province Meteorology Service - Pakse

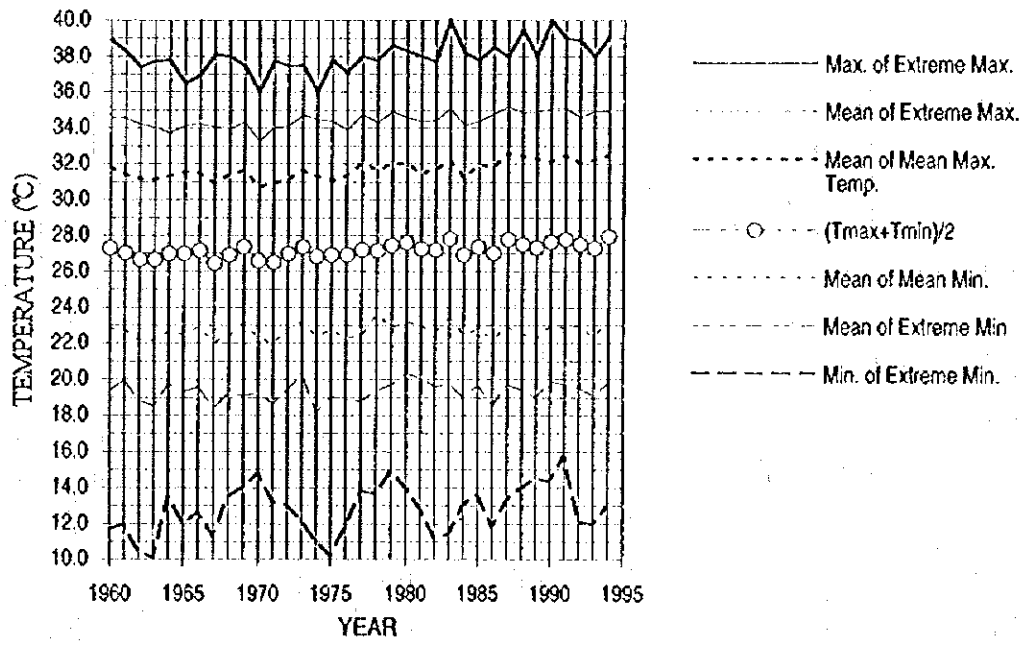


FIGURE A.3-1 ANNUAL TEMPERATURE AT PAKSE STATION

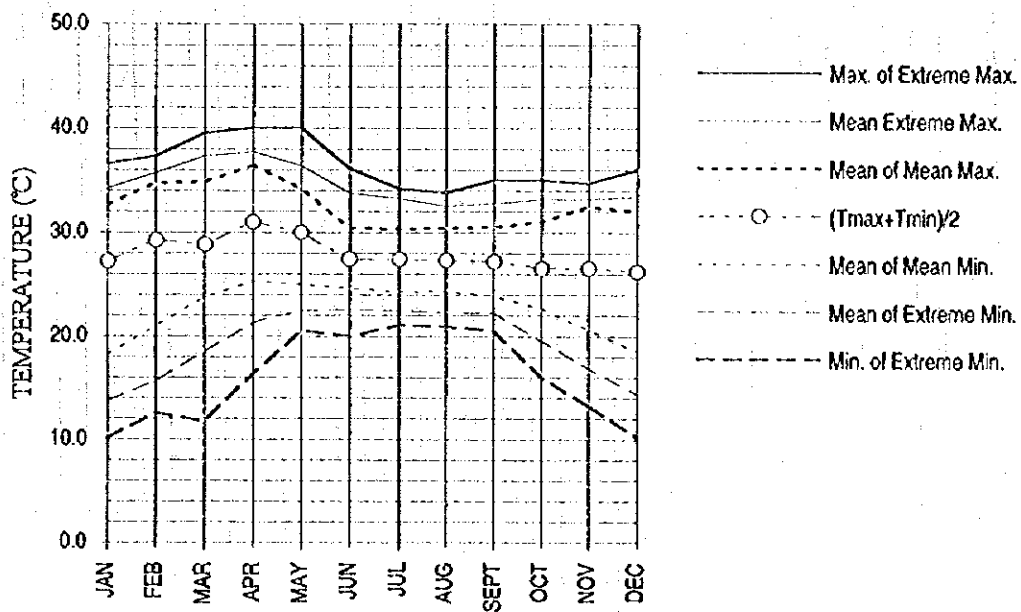


FIGURE A.3-2 MONTHLY TEMPERATURE AT PAKSE STATION (1960-1994)

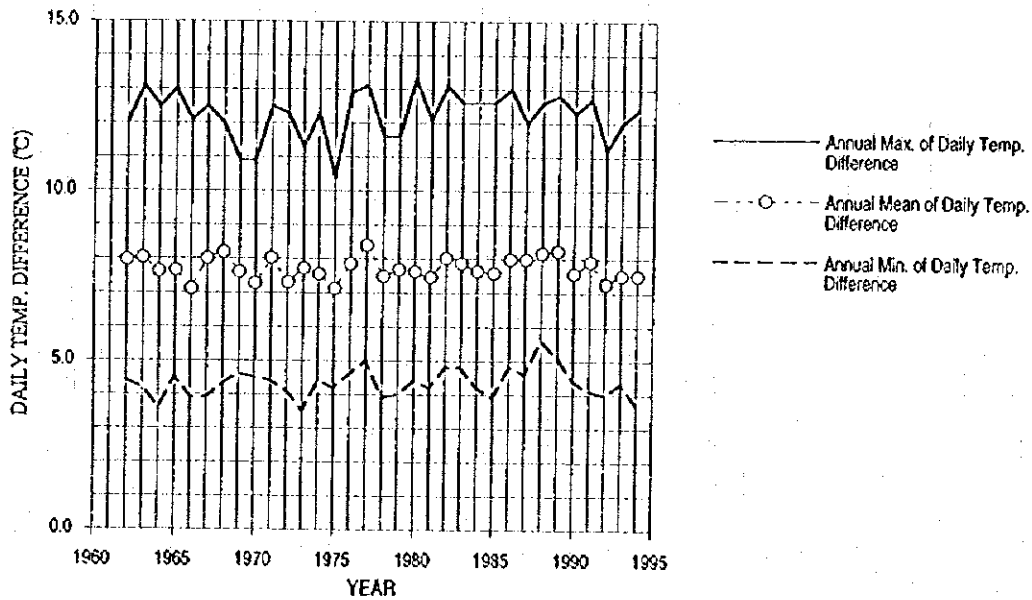


FIGURE A.3-3 ANNUAL 'DAILY TEMPERATURE' DIFFERENCES

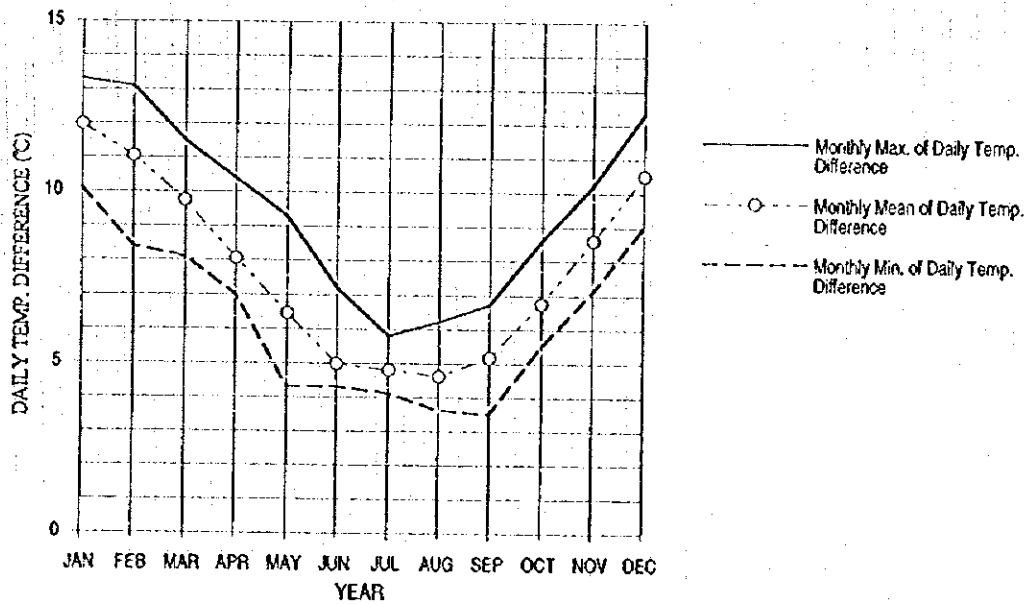


FIGURE A.3-4 MONTHLY 'DAILY TEMPERATURE' DIFFERENCES

TABLE A.3-7 PRECIPITATION AT PAKSE STATION, CALENDAR YEARS (1960-1994)

(Unit: millimeters)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL | MONTHLY MAXIMUM | MONTHLY MINIMUM | MAX DAILY PREC. | DATE |
|------|------|------|------|-------|-------|-------|-------|---------|-------|-------|------|------|-------|--------------------|--------------------|-----------------------|--------|
| 1960 | | | 83.0 | 32.7 | 169.1 | 445.0 | 298.5 | 681.5 | 297.6 | 183.3 | 16.7 | | 2,187 | 681.5 | 16.7 | 148.5 | 27-Jun |
| 1961 | 0.0 | 0.3 | 4.5 | 56.9 | 346.6 | 543.6 | 402.6 | 577.8 | 541.9 | 214.0 | 2.6 | 10.1 | 2,701 | 577.8 | 0.0 | 108.7 | 29-Jun |
| 1962 | | 11.9 | 1.9 | 98.1 | 262.9 | 405.6 | 488.6 | 676.2 | 496.6 | 33.2 | 1.9 | | 2,477 | 676.2 | 1.9 | 110.7 | 08-Jan |
| 1963 | | 0.0 | 55.3 | 65.7 | 116.9 | 186.5 | 534.3 | 383.3 | 256.9 | 111.7 | 55.6 | | 1,766 | 534.3 | 0.0 | 84.9 | 11-Jul |
| 1964 | 0.5 | | | 53.7 | 381.4 | 229.4 | 296.1 | 618.6 | 487.2 | 110.7 | 29.4 | 1.6 | 2,209 | 618.6 | 0.5 | 191.9 | 15-Sep |
| 1965 | | 8.0 | 1.8 | 73.8 | 136.0 | 536.4 | 590.3 | 379.2 | 181.3 | 10.5 | 19.4 | | 1,937 | 590.3 | 1.8 | 112.2 | 17-Jun |
| 1966 | | 1.4 | 7.9 | 17.5 | 336.0 | 284.5 | 511.8 | 382.7 | 358.7 | 67.2 | 2.9 | 13.4 | 1,994 | 511.8 | 1.4 | 138.0 | 22-Jul |
| 1967 | 0.0 | | | 97.0 | 134.9 | 243.4 | 403.6 | 615.1 | 257.4 | 61.5 | 24.1 | | 1,837 | 615.1 | 0.0 | 156.6 | 28-Aug |
| 1968 | | 0.5 | 1.9 | 36.1 | 189.9 | 334.9 | 379.1 | 488.1 | 580.9 | 82.0 | 7.7 | | 2,101 | 580.9 | 0.5 | 143.7 | 05-Sep |
| 1969 | 6.2 | | 3.3 | 87.9 | 267.2 | 364.6 | 602.6 | 240.4 | 233.9 | 112.5 | | | 1,919 | 602.6 | 3.3 | 82.0 | 02-Sep |
| 1970 | | | 24.7 | 10.2 | 189.0 | 286.8 | 265.8 | 600.7 | 294.5 | 30.7 | 13.8 | 8.2 | 1,724 | 600.7 | 8.2 | 66.2 | 18-Aug |
| 1971 | | 64.1 | 17.3 | 9.4 | 196.7 | 603.4 | 633.3 | 338.8 | 128.8 | 29.5 | 1.5 | 18.6 | 2,241 | 803.4 | 1.5 | 95.0 | 18-Jun |
| 1972 | | 68.3 | 22.6 | 133.9 | 35.5 | 742.1 | 477.6 | 397.3 | 260.6 | 86.6 | 28.2 | 14.4 | 2,267 | 742.1 | 14.4 | 253.6 | 04-Jun |
| 1973 | | | 32.2 | 22.3 | 191.1 | 299.3 | 281.0 | 492.1 | 142.1 | 30.7 | 7.8 | 1.2 | 1,500 | 492.1 | 1.2 | 83.6 | 29-May |
| 1974 | 4.0 | 0.0 | 36.8 | 94.9 | 335.8 | 478.2 | 189.3 | 719.9 | 160.1 | 151.7 | 76.7 | 1.6 | 2,249 | 719.9 | 0.0 | 150.0 | 11-Jun |
| 1975 | 9.0 | 8.8 | 52.8 | 42.5 | 258.9 | 385.9 | 337.9 | 678.6 | 263.6 | 35.3 | 9.0 | 3.2 | 2,086 | 678.6 | 3.2 | 77.8 | 09-Sep |
| 1976 | | | 1.5 | 145.8 | 194.9 | 262.1 | 414.1 | 359.6 | 282.2 | 65.7 | 25.9 | 0.0 | 1,752 | 414.1 | 0.0 | 87.9 | 23-Sep |
| 1977 | | | 82.7 | 18.3 | 119.3 | 186.1 | 378.3 | 609.2 | 605.9 | 59.9 | 5.3 | | 2,065 | 609.2 | 5.3 | 150.0 | 11-Sep |
| 1978 | 22.4 | | 54.3 | 118.8 | 256.2 | 409.7 | 425.3 | 922.9 | 350.3 | 79.7 | 15.3 | 0.0 | 2,655 | 922.9 | 0.0 | 273.6 | 16-Aug |
| 1979 | 10.2 | | | 244.5 | 299.7 | 905.0 | 302.5 | 786.7 | 387.0 | 2.0 | | | 2,938 | 905.0 | 2.0 | 175.0 | 08-Aug |
| 1980 | | | 50.4 | 107.6 | 220.3 | 291.4 | 204.7 | 259.3 | 293.4 | 60.8 | 34.9 | 1.7 | 1,525 | 293.4 | 1.7 | 60.4 | 26-Apr |
| 1981 | | 5.4 | 1.4 | 76.0 | 307.9 | 470.0 | 369.8 | 523.2 | 111.7 | 302.1 | 13.7 | 0.0 | 2,171 | 523.2 | 0.0 | 115.8 | 09-Aug |
| 1982 | | | | 65.6 | 113.0 | 514.2 | 322.6 | 309.6 | 418.4 | 87.1 | 9.7 | 2.4 | 1,823 | 514.2 | 2.4 | 70.6 | 19-Jun |
| 1983 | | 0.0 | 2.4 | 17.1 | 207.6 | 837.0 | 168.9 | 404.6 | 197.9 | 270.5 | 6.0 | | 2,112 | 837.0 | 0.0 | 450.3 | 25-Jun |
| 1984 | | 1.4 | 47.4 | 81.4 | 198.0 | 346.8 | 341.0 | 1,037.3 | 372.0 | 152.8 | 53.0 | | 2,631 | 1,037.3 | 1.4 | 131.6 | 31-Aug |
| 1985 | 4.6 | 13.0 | 7.0 | 173.8 | 224.1 | 548.4 | 310.6 | 506.0 | 240.7 | 51.8 | 33.1 | | 2,112 | 548.4 | 4.6 | 89.0 | 13-Jun |
| 1986 | | 0.3 | 0.6 | 42.9 | 333.7 | 268.1 | 501.9 | 813.1 | 242.2 | 210.1 | 25.7 | 6.7 | 2,445 | 813.1 | 0.3 | 105.8 | 07-Aug |
| 1987 | | | 14.0 | 58.9 | 139.2 | 429.8 | 662.7 | 552.3 | 166.6 | 60.1 | 28.1 | 0.0 | 2,112 | 662.7 | 0.0 | 226.4 | 21-Aug |
| 1988 | 0.0 | 43.0 | 3.4 | 50.0 | 274.6 | 411.9 | 201.8 | 334.7 | 75.4 | 278.8 | 2.6 | | 1,676 | 411.9 | 0.0 | 115.7 | 01-Aug |
| 1989 | 2.5 | | 20.7 | 125.2 | 379.9 | 231.6 | 359.5 | 415.9 | 314.7 | 40.6 | 5.2 | | 1,896 | 415.9 | 2.5 | 83.0 | 30-May |
| 1990 | 0.0 | 18.9 | 47.9 | 38.4 | 142.7 | 363.5 | 432.9 | 306.9 | 218.0 | 123.7 | 19.9 | | 1,713 | 432.9 | 0.0 | 92.4 | 15-Jun |
| 1991 | | | 0.7 | 14.9 | 61.1 | 295.8 | 340.2 | 558.7 | 335.7 | 148.6 | 8.7 | 0.5 | 1,765 | 558.7 | 0.5 | 87.6 | 03-Sep |
| 1992 | 16.6 | 10.1 | | 21.0 | 66.5 | 189.8 | 257.4 | 644.8 | 294.2 | 64.8 | 1.0 | 3.1 | 1,569 | 644.8 | 1.0 | 61.2 | 27-Aug |
| 1993 | | | 33.4 | 46.9 | 147.5 | 147.5 | 180.0 | 335.5 | 380.4 | 91.3 | 6.7 | 2.7 | 1,372 | 380.4 | 2.7 | 86.4 | 06-Aug |
| 1994 | | | 13.4 | 22.0 | 253.7 | 359.6 | 516.1 | 538.4 | 769.3 | 151.3 | 23.6 | 9.4 | 2,657 | 769.3 | 9.4 | 178.1 | 05-Sep |

| | | | | | | | | | | | | | |
|------|----|----|----|-----|-----|-----|-----|-------|-----|-----|----|----|-------|
| MEAN | 6 | 14 | 24 | 69 | 214 | 401 | 382 | 528 | 315 | 163 | 19 | 5 | 2,062 |
| MAX. | 22 | 68 | 83 | 245 | 381 | 905 | 663 | 1,037 | 769 | 302 | 77 | 19 | 2,938 |
| MIN. | 0 | 0 | 1 | 9 | 36 | 148 | 169 | 240 | 75 | 2 | 1 | 0 | 1,372 |

| |
|--------|
| 620.6 |
| 1037.3 |
| 293.4 |

| |
|-------|
| 133.3 |
| 450.3 |
| 60.4 |

Source: Provincial Meteorology Service - Pakse

TABLE A.3-8 RAINY DAYS AT PAKSE STATION, CALENDAR YEARS (1960-1994)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL | MONTHLY MAXIMUM |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|--------------------|
| 1960 | 0 | 0 | 5 | 4 | 15 | 19 | 22 | 31 | 18 | 13 | 7 | 0 | 134 | 31 |
| 1961 | 0 | 1 | 4 | 7 | 20 | 23 | 27 | 29 | 28 | 17 | 6 | 2 | 164 | 29 |
| 1962 | 0 | 2 | 3 | 12 | 17 | 22 | 27 | 23 | 20 | 9 | 2 | 0 | 137 | 27 |
| 1963 | 0 | 0 | 5 | 4 | 14 | 23 | 25 | 22 | 25 | 15 | 8 | 0 | 141 | 25 |
| 1964 | 1 | 0 | 0 | 10 | 26 | 20 | 22 | 29 | 21 | 11 | 8 | 1 | 149 | 29 |
| 1965 | 0 | 1 | 3 | 8 | 16 | 27 | 22 | 23 | 18 | 8 | 3 | 0 | 129 | 27 |
| 1966 | 0 | 2 | 2 | 6 | 24 | 20 | 24 | 26 | 15 | 11 | 5 | 4 | 139 | 26 |
| 1967 | 0 | 0 | 0 | 7 | 12 | 15 | 22 | 27 | 27 | 4 | 4 | 0 | 118 | 27 |
| 1968 | 0 | 1 | 2 | 5 | 16 | 22 | 20 | 26 | 22 | 8 | 3 | 0 | 125 | 26 |
| 1969 | 3 | 0 | 3 | 7 | 19 | 23 | 25 | 15 | 16 | 12 | 0 | 0 | 123 | 25 |
| 1970 | 0 | 0 | 2 | 7 | 17 | 19 | 18 | 27 | 17 | 11 | 5 | 2 | 125 | 27 |
| 1971 | 0 | 1 | 1 | 3 | 13 | 27 | 22 | 22 | 20 | 10 | 2 | 1 | 122 | 27 |
| 1972 | 0 | 4 | 2 | 12 | 8 | 23 | 26 | 26 | 20 | 12 | 8 | 4 | 145 | 26 |
| 1973 | 0 | 0 | 3 | 7 | 17 | 21 | 25 | 24 | 20 | 7 | 3 | 1 | 128 | 25 |
| 1974 | 1 | 0 | 3 | 13 | 14 | 21 | 17 | 29 | 20 | 11 | 3 | 1 | 133 | 29 |
| 1975 | 1 | 1 | 4 | 4 | 16 | 28 | 19 | 28 | 20 | 10 | 4 | 2 | 137 | 28 |
| 1976 | 0 | 0 | 1 | 6 | 20 | 19 | 24 | 26 | 17 | 14 | 7 | 0 | 134 | 26 |
| 1977 | 0 | 0 | 3 | 5 | 14 | 16 | 21 | 27 | 18 | 7 | 1 | 0 | 112 | 27 |
| 1978 | 2 | 0 | 6 | 9 | 19 | 22 | 22 | 27 | 18 | 12 | 5 | 0 | 142 | 27 |
| 1979 | 1 | 0 | 0 | 10 | 18 | 22 | 21 | 26 | 19 | 2 | 0 | 0 | 119 | 26 |
| 1980 | 0 | 0 | 2 | 8 | 17 | 23 | 23 | 23 | 22 | 14 | 7 | 1 | 140 | 23 |
| 1981 | 0 | 3 | 1 | 11 | 19 | 25 | 25 | 27 | 14 | 16 | 7 | 0 | 148 | 27 |
| 1982 | 0 | 0 | 0 | 9 | 12 | 24 | 26 | 27 | 21 | 11 | 4 | 1 | 135 | 27 |
| 1983 | 0 | 0 | 2 | 2 | 11 | 18 | 18 | 26 | 16 | 22 | 2 | 0 | 117 | 26 |
| 1984 | 0 | 1 | 5 | 9 | 14 | 21 | 21 | 30 | 19 | 13 | 7 | 0 | 140 | 30 |
| 1985 | 1 | 2 | 3 | 14 | 15 | 23 | 25 | 29 | 18 | 11 | 8 | | 149 | 29 |
| 1986 | 0 | 1 | 1 | 2 | 23 | 20 | 25 | 28 | 15 | 10 | 3 | 2 | 130 | 28 |
| 1987 | 0 | 0 | 4 | 7 | 14 | 21 | 28 | 17 | 18 | 10 | 7 | 0 | 126 | 28 |
| 1988 | 0 | 1 | 1 | 11 | 18 | 21 | 19 | 20 | 14 | 15 | 3 | 0 | 123 | 21 |
| 1989 | 1 | 0 | 5 | 11 | 19 | 18 | 23 | 23 | 23 | 10 | 2 | 0 | 135 | 23 |
| 1990 | 0 | 1 | 9 | 10 | 16 | 29 | 26 | 22 | 20 | 15 | 6 | 0 | 154 | 29 |
| 1991 | 0 | 0 | 1 | 4 | 15 | 26 | 25 | 28 | 23 | 21 | 3 | 1 | 147 | 28 |
| 1992 | 3 | 2 | 0 | 3 | 19 | 25 | 22 | 29 | 23 | 16 | 1 | 2 | 145 | 29 |
| 1993 | 0 | 0 | 6 | 10 | 18 | 20 | 23 | 28 | 21 | 12 | 4 | 2 | 144 | 28 |
| 1994 | 0 | 0 | 5 | 5 | 19 | 24 | 28 | 25 | 26 | 10 | 2 | 3 | 147 | 28 |

| | | | | | | | | | | | | | |
|---------|---|---|---|----|----|----|----|----|----|----|---|---|-----|
| MEAN | 0 | 1 | 3 | 7 | 17 | 22 | 23 | 26 | 20 | 12 | 4 | 1 | 135 |
| MAXIMUM | 3 | 4 | 9 | 14 | 26 | 29 | 28 | 31 | 28 | 22 | 8 | 4 | 164 |
| MINIMUM | 0 | 0 | 0 | 2 | 8 | 15 | 17 | 15 | 14 | 2 | 0 | 0 | 112 |

Source: Province Meteorology Service - Pakse

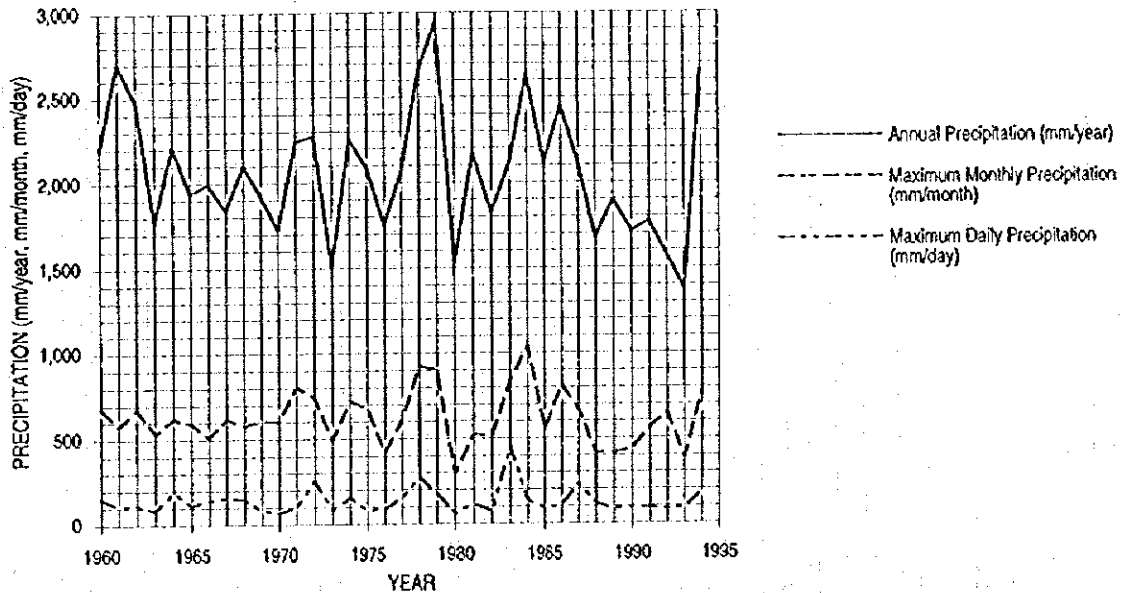


FIGURE A.3-5 PRECIPITATION AT PAKSE STATION, CALENDAR YEARS (1960-1994)

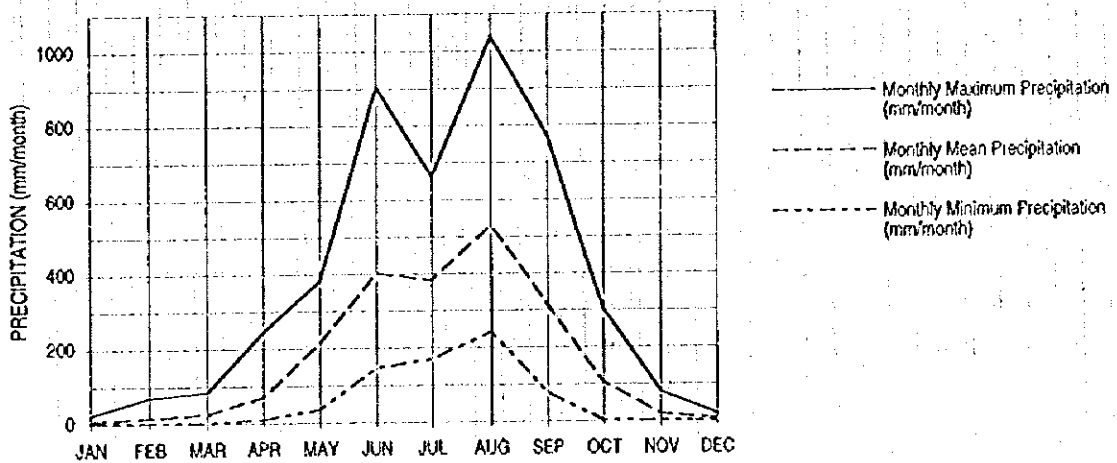


FIGURE A.3-6 MONTHLY PRECIPITATION AT PAKSE STATION (1960-1994)

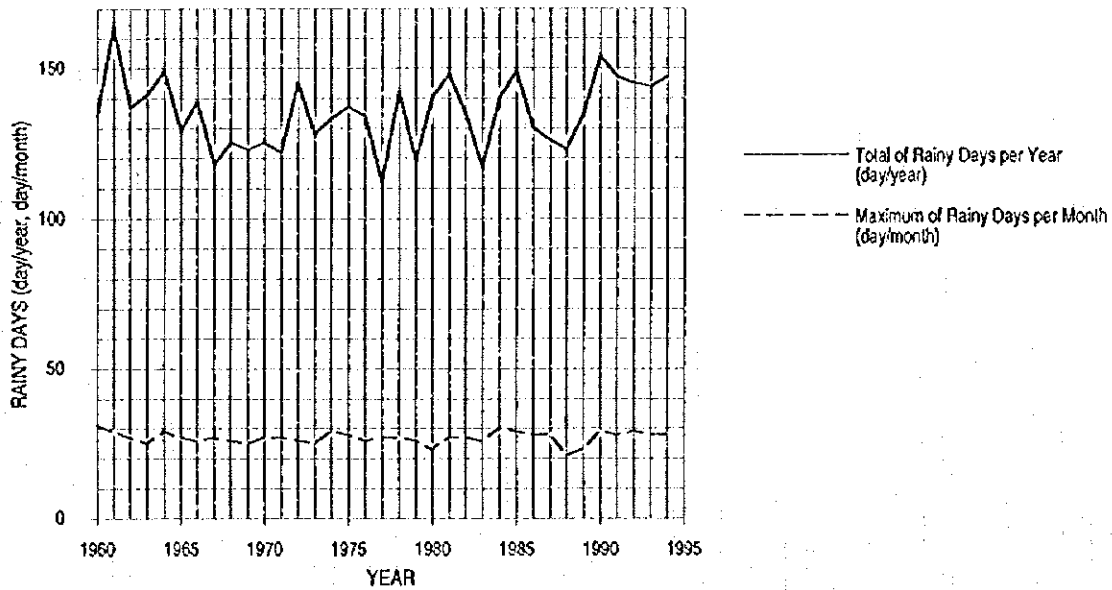


FIGURE A.3-7 RAINY DAYS AT PAKSE STATION, CALENDAR YEARS (1960-1994)

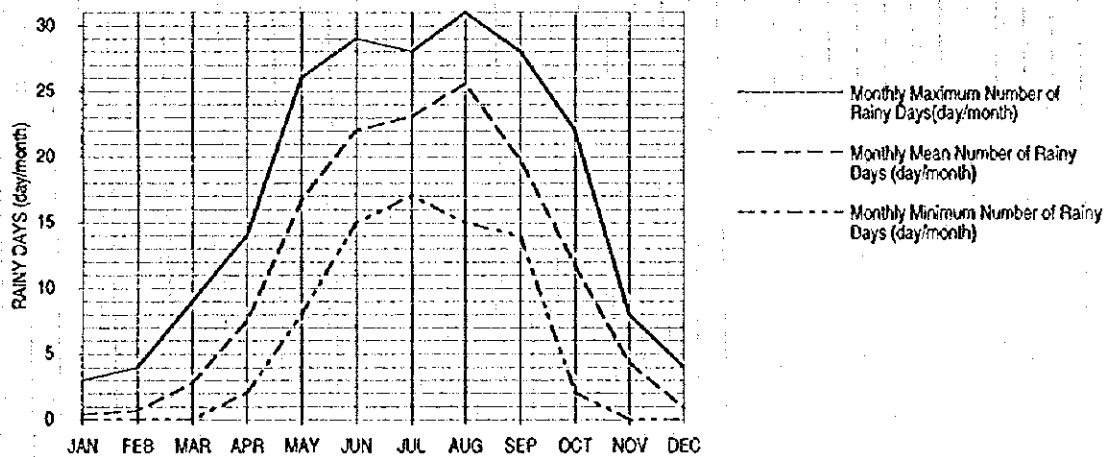
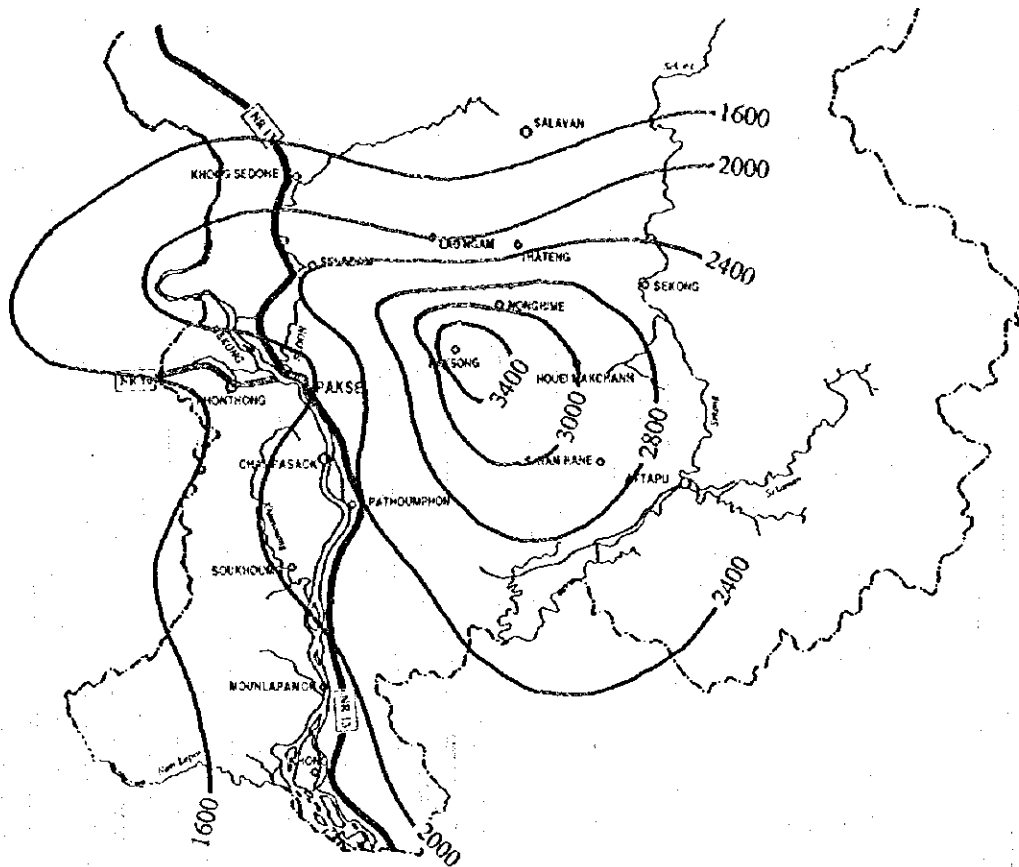


FIGURE A.3-8 MONTHLY RAINY DAYS AT PAKSE STATION (1960-1994)



Source: Ministry of Agriculture and Forestry

FIGURE A.3-9 ANNUAL ISOHYETS OF THE BOLAVEN PLATEAU (1/8)

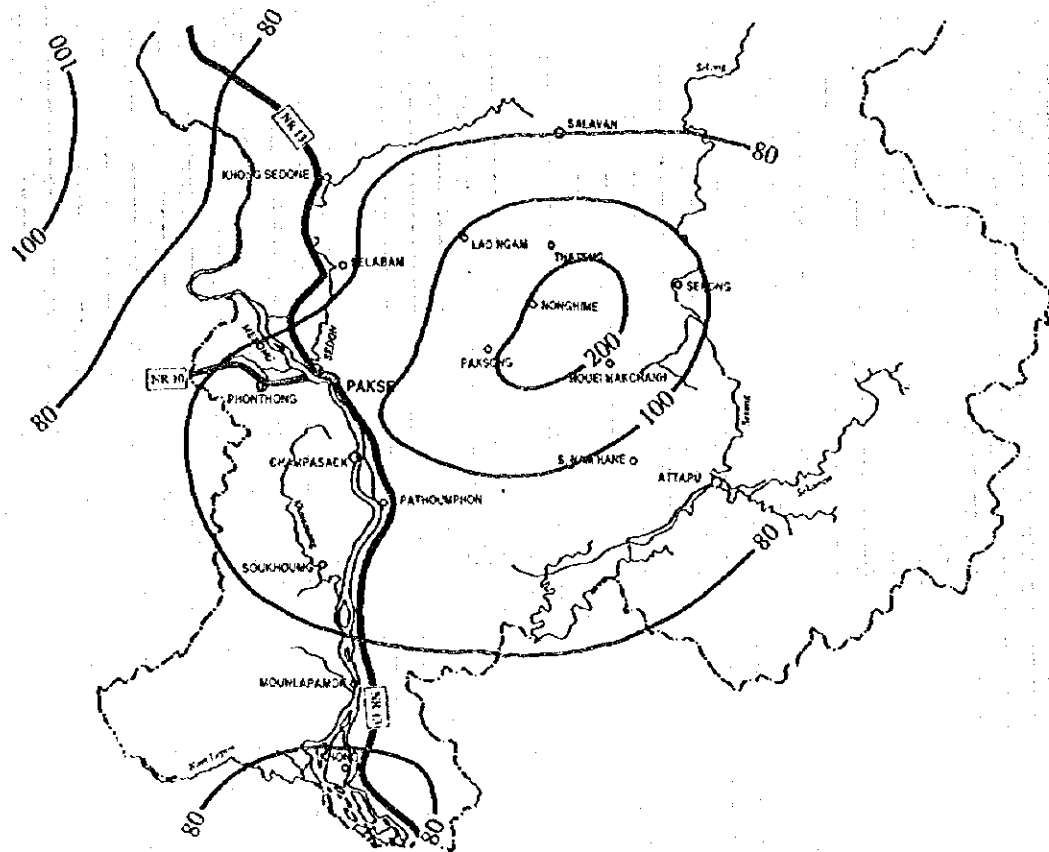


FIGURE A.3-9 MONTHLY ISOHYETS OF THE BOLAVEN PLATEAU (2/8): APRIL

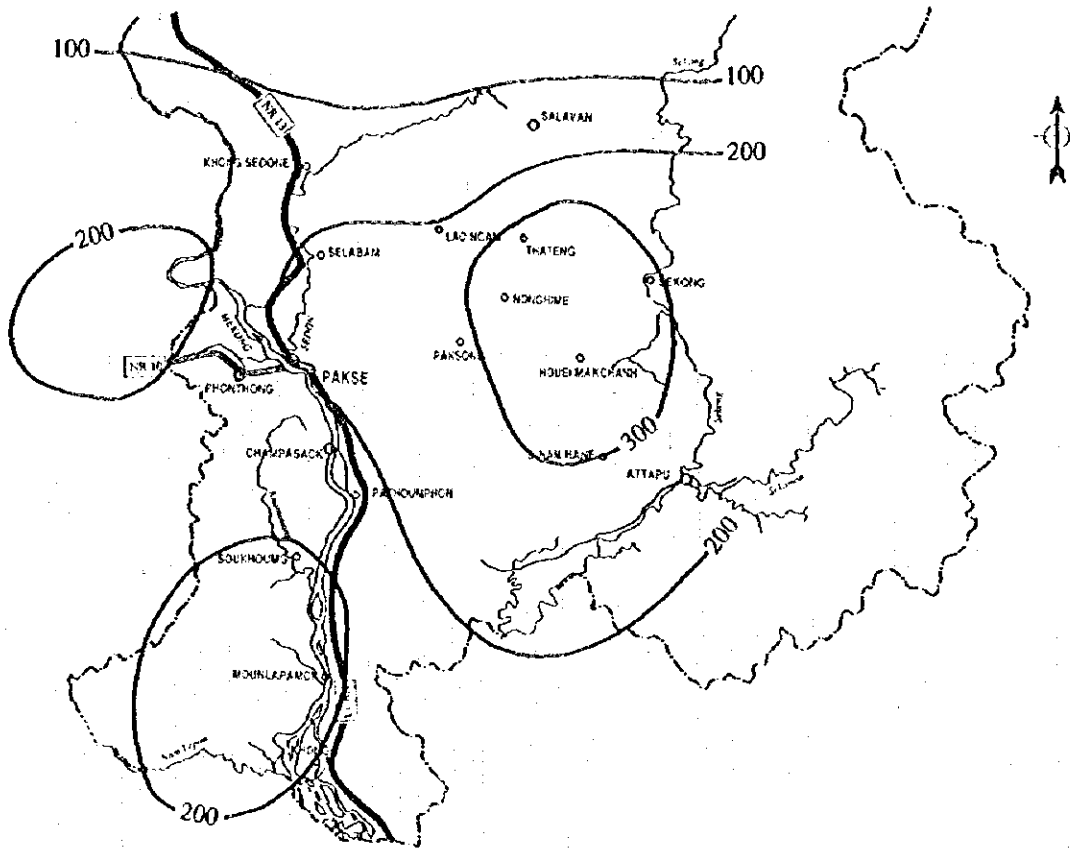


FIGURE A.3-9 MONTHLY ISOHYETS OF THE BOLAVEN PLATEAU (3/8): MAY

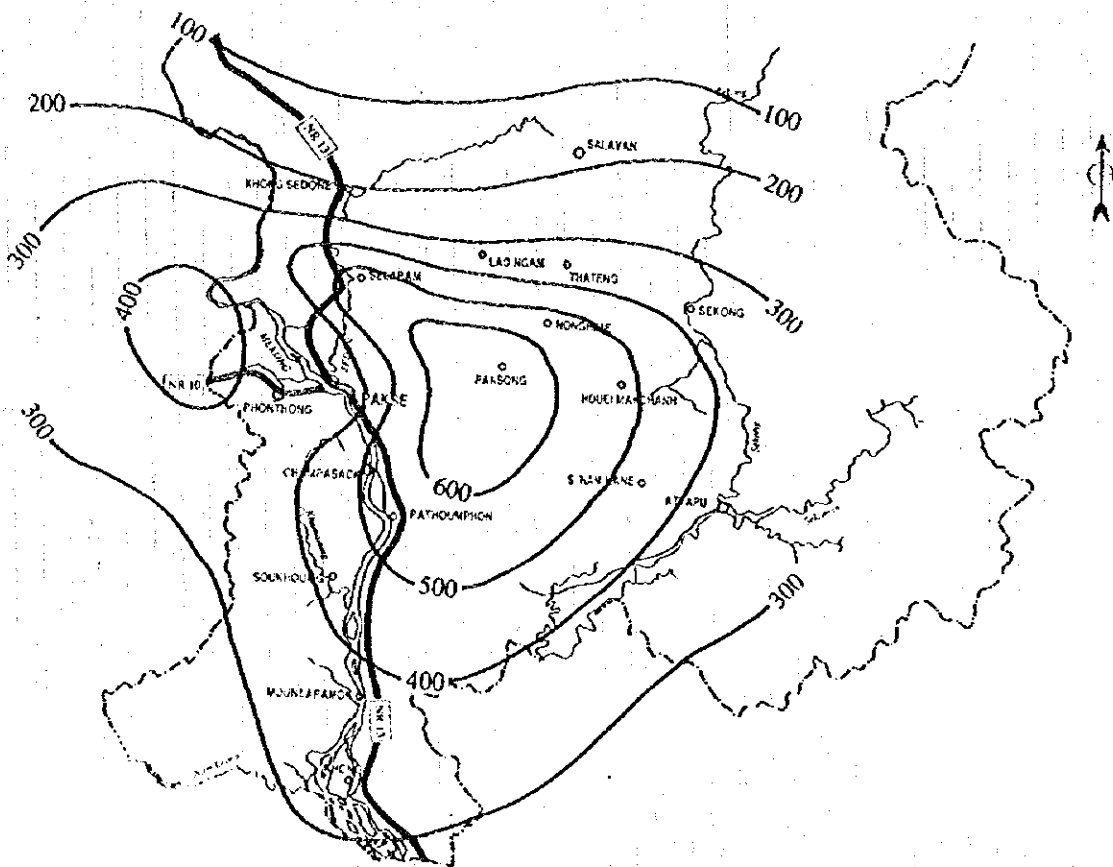


FIGURE A.3-9 MONTHLY ISOHYETS OF THE BOLAVEN PLATEAU (4/8): JUNE

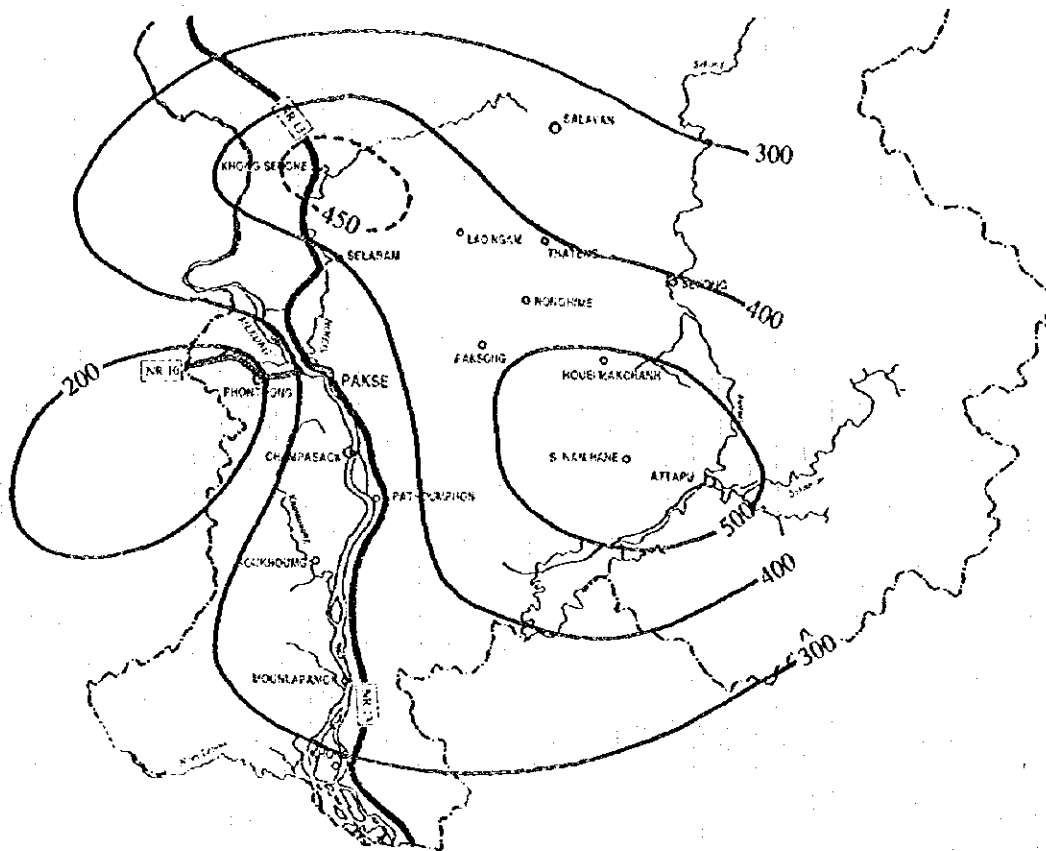


FIGURE A.3-9 MONTHLY ISOHYETS OF THE BOLAVEN PLATEAU (5/8): JULY

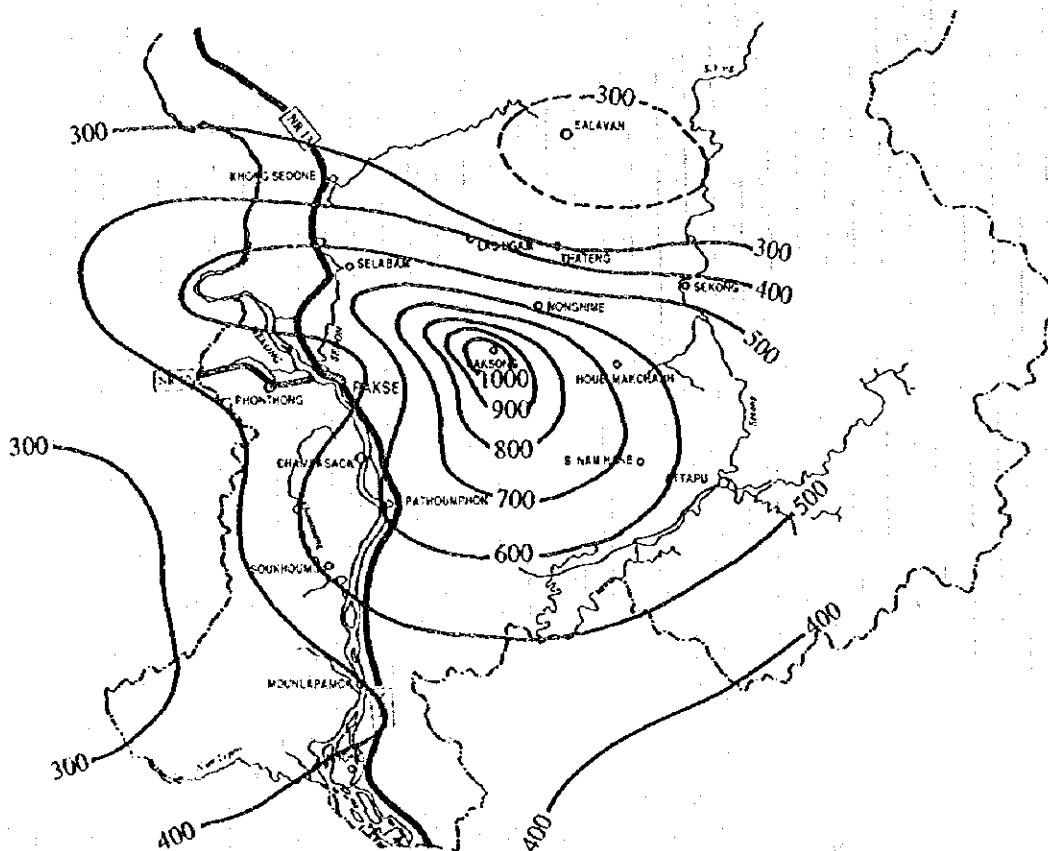


FIGURE A.3-9 MONTHLY ISOHYETS OF THE BOLAVEN PLATEAU (6/8): AUGUST

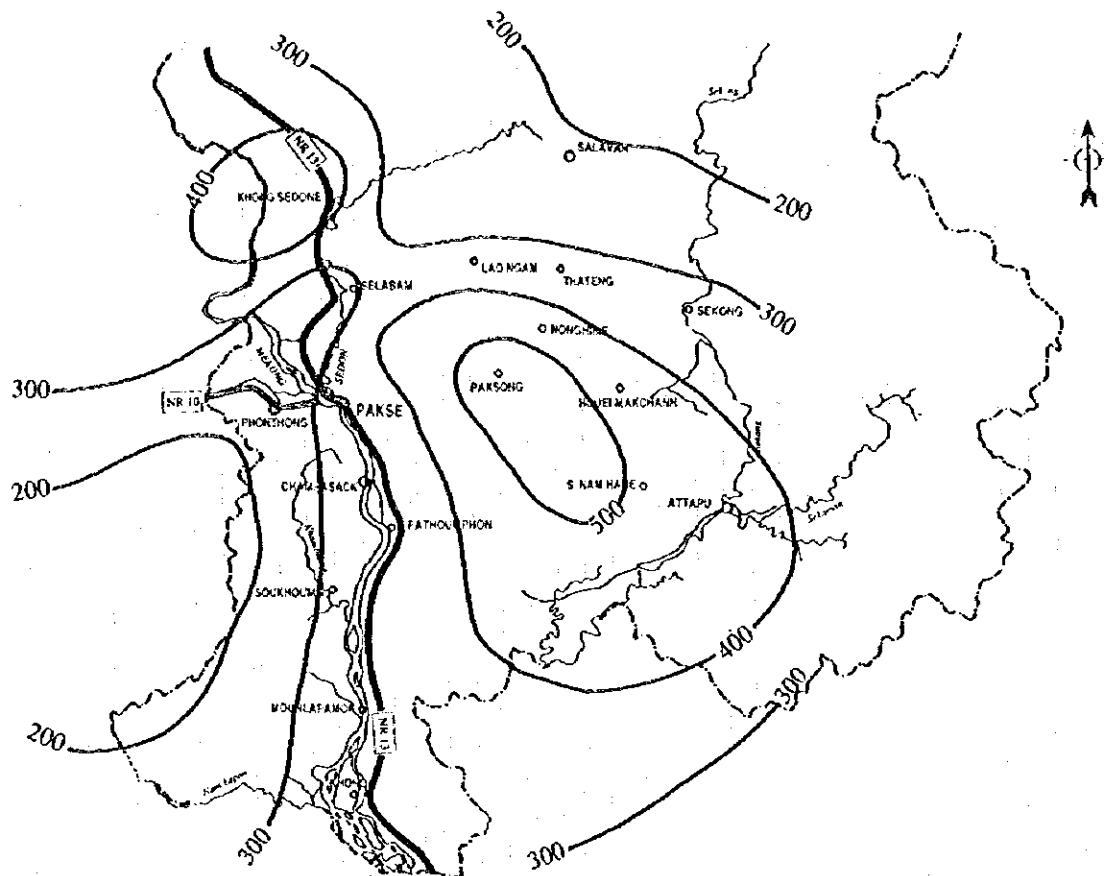


FIGURE A.3-9 MONTHLY ISOHYETS OF THE BOLAVEN PLATEAU (7/8): SEPTEMBER

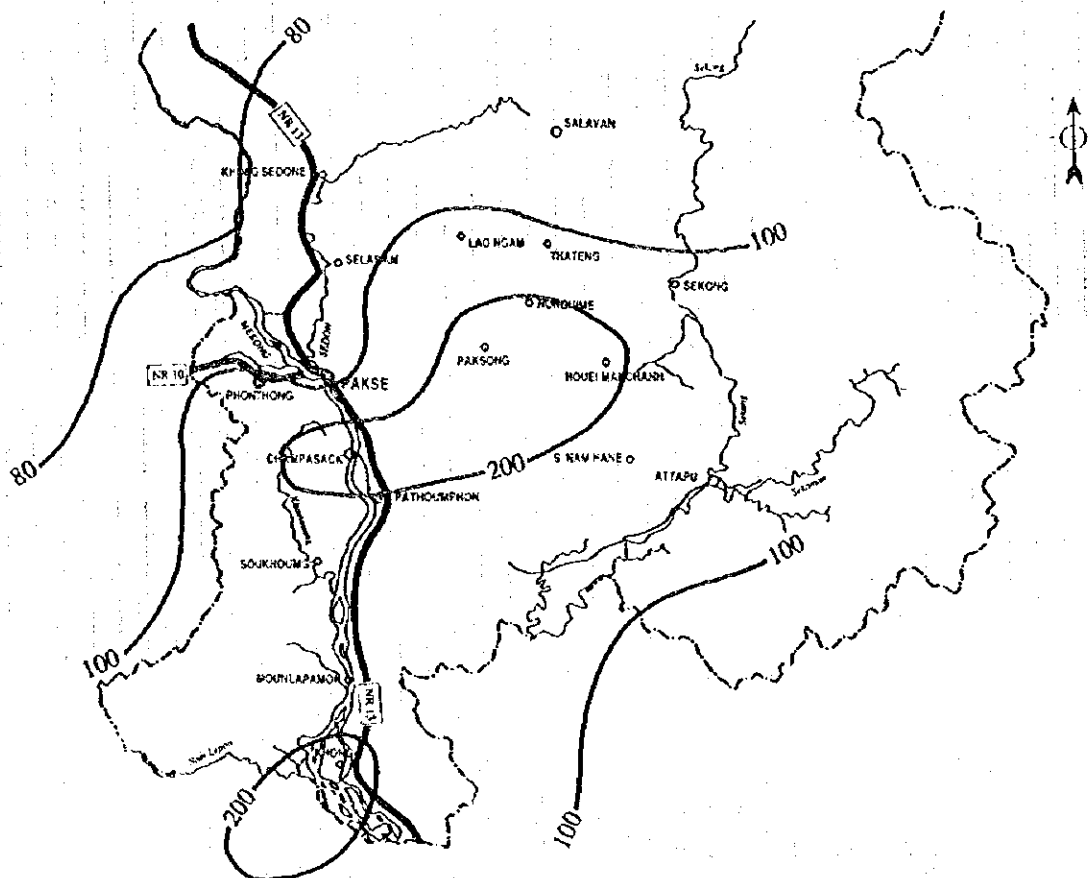


FIGURE A.3-9 MONTHLY ISOHYETS OF THE BOLAVEN PLATEAU (8/8): OCTOBER

TABLE A.3-9 RAINFALL INTENSITY ANALYSIS, YEARS 1965,66, 68,70 AND 1980-85

| Duration (min) | Return period (year) | | | | | | | | | |
|-------------------|----------------------|------------------------|------------------|------------------------|------------------|------------------------|------------------|------------------------|------------------|------------------------|
| | 5 | | 10 | | 25 | | 50 | | 100 | |
| | Rainfall (cm) | Intensity (cm/hour) | Rainfall (cm) | Intensity (cm/hour) | Rainfall (cm) | Intensity (cm/hour) | Rainfall (cm) | Intensity (cm/hour) | Rainfall (cm) | Intensity (cm/hour) |
| 15 | 3 | 12 | 4 | 14 | 4 | 17 | 5 | 19 | 5 | 21 |
| 30 | 4 | 8 | 5 | 10 | 6 | 12 | 7 | 14 | 7 | 15 |
| 60 | 5 | 5 | 6 | 6 | 7 | 7 | 8 | 8 | 9 | 9 |
| 120 | 7 | 3 | 8 | 4 | 10 | 5 | 12 | 6 | 13 | 6 |
| 180 | 8 | 3 | 10 | 3 | 12 | 4 | 14 | 5 | 15 | 5 |
| 1,440 | 140 | 1 | 18 | 1 | 22 | 1 | 26 | 1 | 29 | 1 |

Source: Ministry of Agriculture and Forestry, Vientiane

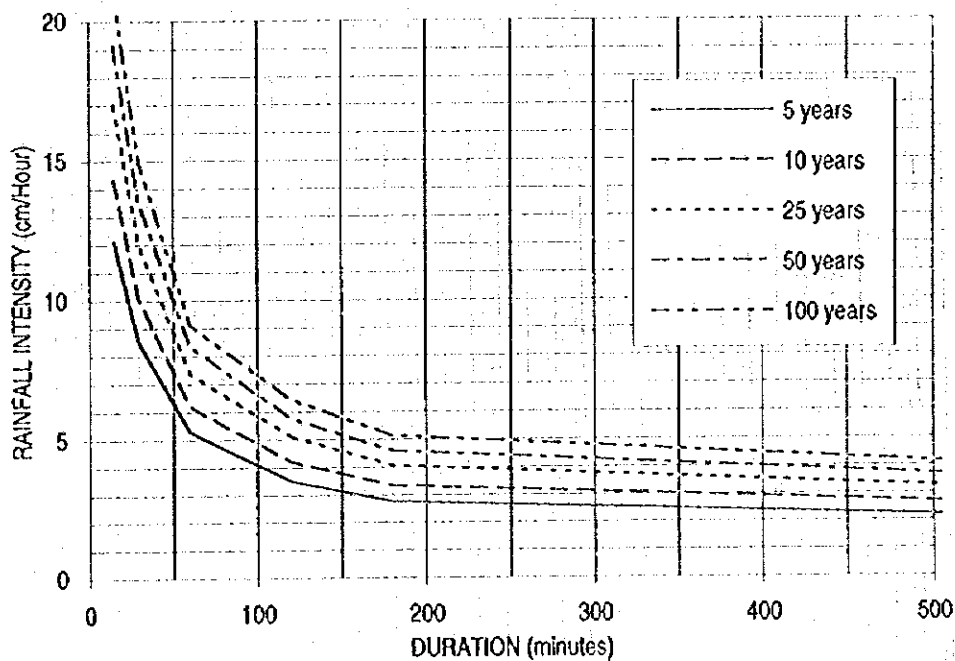


FIGURE A.3-10 RAINFALL INTENSITY AND DURATION

TABLE A.3-10 DAILY EVAPORATION (PICHE) REGISTERED AT PAKSE STATION (1/4)

| YEAR | JANUARY | | | | | | | | | | FEBRUARY | | | | | | | | | | MARCH | | | | | | | | | |
|------|----------|------|----------|-------|-------|-----------|-------------|-----------|------|----------|----------|----------|-------|-----------|-------------|-----------|-------|----------|----------|----------|-------|-----------|-------------|-----------|------|----|----|----|----|----|
| | 11 to 10 | | 21 to 10 | | MONTH | Total Day | Total Night | Max Daily | Date | 10 to 11 | 11 to 20 | 21 to 30 | MONTH | Total Day | Total Night | Max Daily | Date | 10 to 11 | 11 to 20 | 21 to 30 | MONTH | Total Day | Total Night | Max Daily | Date | | | | | |
| | 10 | 11 | 10 | 11 | | | | | | | | | | | | | | | | | | | | | | 10 | 11 | 10 | 11 | 10 |
| 1967 | 63.7 | 61.5 | 57.8 | 183.0 | 127.0 | 56.0 | 8.4 | 2 | 57.0 | 63.5 | 54.2 | 174.7 | 127.5 | 47.2 | 7.9 | 15 | 68.0 | 73.1 | 94.3 | 235.4 | 162.5 | 72.9 | 9.5 | 30 | | | | | | |
| 1968 | 51.4 | 47.0 | 53.4 | 151.3 | 107.2 | 44.6 | 7.7 | 2 | 55.2 | 49.9 | 59.2 | 168.3 | 103.6 | 59.7 | 8.6 | 25 | 66.2 | 69.9 | 89.4 | 225.5 | 137.5 | 88.0 | 9.5 | 30 | | | | | | |
| 1969 | 47.9 | 48.6 | 60.1 | 156.6 | 111.6 | 45.0 | 6.6 | 29 | 55.3 | 73.7 | 61.6 | 190.6 | 125.1 | 65.5 | 9.4 | 25 | 73.5 | 65.6 | 78.7 | 217.8 | 140.6 | 77.2 | 9.6 | 11 | | | | | | |
| 1970 | 38.5 | 44.0 | 54.5 | 137.0 | 92.8 | 44.2 | 6.0 | 26-30 | 57.9 | 55.3 | 53.6 | 166.8 | 115.5 | 60.3 | 8.3 | 27 | 69.9 | 76.0 | 72.2 | 218.1 | 135.2 | 82.9 | 17.2 | 22 | | | | | | |
| 1971 | 55.2 | 31.0 | 46.5 | 132.7 | 87.6 | 45.1 | 7.7 | 8 | 48.5 | 58.3 | 20.7 | 127.5 | 84.1 | 43.4 | 7.4 | 14 | 57.5 | 52.2 | 63.1 | 172.8 | 106.7 | 66.1 | 7.8 | 14 | | | | | | |
| 1972 | 46.4 | 43.0 | 52.8 | 142.2 | 92.5 | 49.7 | 6.3 | 7 | 39.4 | 50.9 | 36.3 | 126.6 | 78.0 | 48.6 | 7.9 | 18 | 54.7 | 53.4 | 52.0 | 160.1 | 95.7 | 63.4 | 6.7 | 13 | | | | | | |
| 1973 | 39.0 | 42.3 | 49.3 | 130.6 | 93.9 | 36.7 | 5.8 | 11 | 54.1 | 57.6 | 47.8 | 159.5 | 107.9 | 51.6 | 7.0 | 18 | 59.3 | 40.7 | 61.7 | 161.7 | 102.0 | 61.7 | 9.0 | 30 | | | | | | |
| 1974 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1975 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1976 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1977 | 77.0 | 65.7 | 94.6 | 237.3 | 166.8 | 70.5 | 9.2 | 8 | 89.3 | 77.5 | 95.4 | 262.2 | 173.5 | 88.7 | 15.2 | 21 | 81.5 | 89.4 | 105.7 | 276.6 | 180.6 | 96.0 | 11.9 | 15 | | | | | | |
| 1978 | 70.0 | 75.4 | 65.3 | 210.7 | 142.2 | 68.5 | 9.2 | 20-21 | 64.2 | 66.6 | 51.7 | 181.9 | 112.8 | 68.1 | 7.5 | 17 | 31.8 | 67.1 | 111.9 | 210.8 | 142.8 | 68.0 | 11.1 | 31 | | | | | | |
| 1979 | 51.3 | 61.4 | 73.8 | 186.5 | 125.0 | 61.5 | 9.3 | 28 | 58.3 | 80.7 | 55.1 | 194.1 | 121.7 | 72.4 | 9.7 | 21 | 81.7 | 70.7 | 138.2 | 290.6 | 175.3 | 115.3 | 16.7 | 26 | | | | | | |
| 1980 | 67.7 | 62.7 | 78.1 | 208.5 | 144.8 | 63.7 | 9.7 | 4 | 76.0 | 82.3 | 79.5 | 237.8 | 153.4 | 84.4 | 10.1 | 28 | 107.9 | 96.5 | 84.5 | 288.9 | 187.3 | 101.6 | 11.9 | 5.7 | | | | | | |
| 1981 | 58.5 | 69.7 | 74.6 | 202.8 | 139.2 | 69.6 | 10.0 | 12 | 70.9 | 65.8 | 58.5 | 195.2 | 128.6 | 66.6 | 9.2 | 16 | 84.2 | 93.0 | 119.9 | 302.1 | 193.0 | 109.1 | 12.9 | 26 | | | | | | |
| 1982 | 60.1 | 62.8 | 76.5 | 199.4 | 130.2 | 66.2 | 8.7 | 25 | 69.6 | 76.7 | 76.1 | 221.4 | 138.4 | 83.0 | 11.2 | 25 | 96.9 | 106.2 | 96.8 | 303.9 | 196.0 | 107.9 | 12.9 | 17 | | | | | | |
| 1983 | 59.7 | 64.8 | 74.1 | 198.6 | 134.1 | 64.5 | 9.3 | 22 | 75.9 | 75.0 | 72.1 | 223.0 | 145.3 | 77.7 | 11.5 | 28 | 85.8 | 93.7 | 121.0 | 300.5 | 182.2 | 118.3 | 13.3 | 24 | | | | | | |
| 1984 | 67.2 | 59.4 | 77.6 | 204.2 | 135.7 | 66.7 | 8.6 | 7 | 79.0 | 89.4 | 85.9 | 254.3 | 159.8 | 100.5 | 11.5 | 26 | 85.8 | 96.8 | 93.3 | 275.9 | 170.4 | 105.5 | 11.4 | 28 | | | | | | |
| 1985 | 61.7 | 67.4 | 75.6 | 204.7 | 138.1 | 66.6 | 8.6 | 29 | 64.8 | 81.9 | 63.0 | 209.7 | 134.7 | 75.0 | 10.2 | 17 | 77.3 | 90.1 | 93.6 | 261.0 | 160.9 | 100.1 | 10.5 | 7 | | | | | | |
| 1986 | 69.3 | 63.9 | 80.0 | 213.2 | 143.3 | 69.9 | 9.5 | 25 | 74.0 | 84.9 | 68.1 | 227.0 | 145.3 | 81.7 | 10.3 | 13 | 88.5 | 103.4 | 96.3 | 288.2 | 186.3 | 101.9 | 11.8 | 15 | | | | | | |
| 1987 | 50.1 | 53.5 | 67.0 | 170.6 | 112.8 | 57.8 | 7.7 | 26 | 61.2 | 66.5 | 53.8 | 181.5 | 114.8 | 66.7 | 8.0 | 18 | 64.5 | 76.6 | 92.2 | 233.3 | 146.6 | 86.7 | 10.0 | 22 | | | | | | |
| 1988 | 50.1 | 55.5 | 63.1 | 168.7 | 114.6 | 54.1 | 7.0 | 31 | 54.0 | 58.5 | 65.5 | 178.0 | 107.6 | 70.4 | 8.5 | 8 | 70.7 | 80.0 | 89.6 | 240.3 | 147.3 | 93.0 | 10.0 | 22 | | | | | | |
| 1989 | 56.2 | 68.0 | 54.0 | 178.2 | 118.9 | 59.3 | 9.7 | 15 | 61.6 | 63.2 | 61.5 | 186.3 | 116.4 | 69.9 | 8.7 | 24 | 77.8 | 57.6 | 58.9 | 194.3 | 120.6 | 73.7 | 9.2 | 3 | | | | | | |
| 1990 | 54.8 | 55.6 | 70.6 | 181.0 | 124.1 | 56.9 | 7.8 | 22 | 63.1 | 68.0 | 56.6 | 187.7 | 122.1 | 65.6 | 8.7 | 19 | 60.4 | 57.5 | 56.9 | 174.8 | 118.9 | 55.9 | 9.1 | 20 | | | | | | |
| 1991 | 46.0 | 52.8 | 52.3 | 151.1 | 109.6 | 41.5 | 7.2 | 15 | 66.9 | 55.8 | 48.7 | 171.4 | 109.8 | 61.6 | 7.7 | 3 | 57.4 | 64.2 | 83.4 | 205.0 | 127.2 | 74.8 | 9.0 | 26 | | | | | | |
| 1992 | 34.8 | 48.8 | 54.4 | 138.0 | 95.6 | 42.2 | 6.6 | 13 | 55.6 | 55.2 | 48.1 | 158.9 | 107.2 | 51.7 | 7.2 | 27 | 67.0 | 60.5 | 83.3 | 219.8 | 143.8 | 76.0 | 8.5 | 28 | | | | | | |
| 1993 | 44.5 | 49.2 | 58.4 | 152.1 | 105.5 | 46.6 | 7.7 | 27 | 55.0 | 53.9 | 52.0 | 160.9 | 106.7 | 54.2 | 8.7 | 23 | 66.7 | 45.8 | 62.7 | 175.2 | 113.4 | 61.8 | 8.3 | 28 | | | | | | |
| 1994 | 43.7 | 53.9 | 59.4 | 157.0 | 108.6 | 48.4 | 7.6 | 20 | 60.8 | 65.8 | 58.0 | 184.6 | 120.1 | 64.5 | 9.1 | 25 | 75.4 | 58.2 | 58.9 | 192.5 | 121.3 | 71.2 | 9.7 | 5 | | | | | | |
| MEAN | 54.6 | 56.3 | 65.0 | 175.9 | 119.9 | 55.8 | 8.1 | | 62.7 | 67.0 | 59.3 | 189.0 | 122.2 | 67.2 | 9.2 | | 72.5 | 74.2 | 86.3 | 233.0 | 147.8 | 85.2 | 10.7 | 20.5 | | | | | | |
| MAX | 77.0 | 75.4 | 94.6 | 237.3 | 166.8 | 70.5 | 10.0 | | 89.3 | 89.4 | 95.4 | 262.2 | 173.5 | 100.5 | 15.2 | | 107.9 | 108.2 | 138.2 | 303.9 | 196.0 | 118.3 | 17.2 | 31.0 | | | | | | |
| MIN | 34.8 | 31.0 | 46.5 | 130.6 | 87.6 | 36.7 | 5.8 | | 39.4 | 48.9 | 20.7 | 126.6 | 78.0 | 43.4 | 7.0 | | 31.8 | 40.7 | 52.0 | 160.1 | 95.7 | 55.9 | 6.7 | 3.0 | | | | | | |

TABLE A.3-10 DAILY EVAPORATION (PICHE) REGISTERED AT PAKSE STATION (2/4)

| YEAR | APRIL | | | | | | | | | | MAY | | | | | | | | | | JUNE | | | | | | | | | |
|------|----------|----------|-----------|-------------|-----------|-------|----------|----------|-----------|-------------|-----------|-------|----------|----------|-----------|-------------|-----------|------|----------|----------|-----------|-------------|-----------|--------|----------|----------|----------|----------|--|--|
| | 11 to 21 | | Total Day | Total Night | Max Daily | Date | 11 to 21 | | Total Day | Total Night | Max Daily | Date | 11 to 21 | | Total Day | Total Night | Max Daily | Date | 11 to 21 | | Total Day | Total Night | Max Daily | Date | | | | | | |
| | 10 to 10 | 20 to 30 | | | | | 10 to 10 | 20 to 30 | | | | | 10 to 10 | 20 to 30 | | | | | 10 to 10 | 20 to 30 | | | | | 10 to 10 | 20 to 30 | 10 to 10 | 20 to 30 | | |
| 1967 | 81.2 | 58.3 | 41.6 | 181.1 | | 9.8 | 1.3 | 46.2 | 38.9 | 47.6 | 132.7 | 34.0 | 13.6 | 7.0 | 23 | 30.0 | 27.8 | 28.2 | 86.0 | 59.9 | 26.1 | 7.4 | 1 | | | | | | | |
| 1968 | 76.5 | 63.1 | 57.5 | 197.1 | 125.9 | 71.2 | 9.9 | 2 | 46.2 | 40.3 | 46.8 | 133.3 | 86.8 | 46.5 | 7.5 | 4 | 21.2 | 26.7 | 26.0 | 73.9 | 50.5 | 23.4 | 4.7 | 13 | | | | | | |
| 1969 | 85.8 | 65.4 | 57.4 | 208.6 | 133.9 | 72.7 | 9.3 | 5.6 | 30.5 | 49.5 | 29.9 | 109.9 | 78.4 | 31.5 | 7.0 | 13 | 27.5 | 22.1 | 29.0 | 78.6 | 50.8 | 19.7 | 4.1 | 11 | | | | | | |
| 1970 | 54.6 | 60.5 | 45.1 | 160.2 | 103.9 | 56.3 | 9.1 | 17 | 50.6 | 43.7 | 81.3 | 175.6 | 113.7 | 61.3 | 8.8 | 30 | 33.8 | 21.9 | 20.7 | 78.4 | 49.8 | 28.6 | 5.1 | 6 | | | | | | |
| 1971 | 45.9 | 54.8 | 59.3 | 160.0 | 106.7 | 53.3 | 7.5 | 21 | 41.5 | 34.0 | 29.0 | 104.5 | 70.9 | 33.6 | 6.8 | 2 | 17.4 | 15.2 | 20.5 | 53.1 | 36.9 | 16.2 | 3.0 | 12, 26 | | | | | | |
| 1972 | 38.0 | 37.3 | 45.0 | 120.3 | 77.3 | 43.0 | 7.1 | 3 | 61.2 | 55.3 | 58.9 | 175.4 | 115.6 | 59.8 | 9.4 | 25 | 18.4 | 27.7 | 32.8 | 78.9 | 52.0 | 26.9 | 5.2 | 24 | | | | | | |
| 1973 | 53.9 | 77.0 | 54.4 | 185.3 | 118.2 | 67.1 | 9.0 | 15 | 42.7 | 40.0 | 32.1 | 114.8 | 76.8 | 38.0 | 6.1 | 12 | 26.1 | 26.1 | 34.0 | 89.2 | 62.3 | 29.6 | 4.6 | 22 | | | | | | |
| 1974 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1975 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1976 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1977 | 76.5 | 73.1 | 78.7 | 228.3 | 153.0 | 75.3 | 10.3 | 21 | 74.8 | 66.2 | 50.9 | 191.9 | 133.4 | 58.5 | 9.7 | 1 | 69.1 | 46.4 | 37.9 | 153.4 | 101.1 | 52.3 | 7.6 | 6 | | | | | | |
| 1978 | 97.6 | 49.1 | 57.3 | 198.0 | 129.8 | 68.2 | 11.8 | 7 | 50.6 | 43.0 | 31.4 | 125.0 | 84.5 | 40.5 | 7.6 | 11 | 33.9 | 21.2 | 15.5 | 70.6 | 45.3 | 25.3 | 3.8 | 4, 6 | | | | | | |
| 1979 | 81.1 | 70.7 | 49.2 | 201.0 | 132.0 | 69.0 | 13.4 | 2 | 57.6 | 37.6 | 45.7 | 140.9 | 100.5 | 40.4 | 8.5 | 5 | 30.5 | 22.2 | 17.3 | 70.3 | 48.3 | 22.0 | 4.0 | 10 | | | | | | |
| 1980 | 80.4 | 77.4 | 78.3 | 236.1 | 153.0 | 83.2 | 11.4 | 3 | 66.8 | 49.4 | 43.5 | 159.7 | 106.1 | 53.6 | 10.2 | 1 | 33.9 | 26.0 | 24.7 | 84.6 | 59.2 | 25.4 | 4.3 | 1 | | | | | | |
| 1981 | 102.0 | 75.0 | 61.9 | 238.9 | 153.5 | 85.4 | 12.7 | 1 | 66.4 | 42.7 | 45.1 | 154.2 | 96.1 | 58.1 | 10.3 | 7 | 40.0 | 23.6 | 31.1 | 88.7 | 58.9 | 29.8 | 5.9 | 5 | | | | | | |
| 1982 | 83.4 | 54.0 | 67.0 | 204.4 | 131.9 | 72.5 | 9.9 | 6 | 53.1 | 53.4 | 47.1 | 153.6 | 100.3 | 53.3 | 7.3 | 2 | 40.0 | 35.8 | 27.6 | 103.4 | 67.6 | 35.8 | 5.5 | 2 | | | | | | |
| 1983 | 107.0 | 107.7 | 103.8 | 318.5 | 193.6 | 124.9 | 12.9 | 10 | 62.7 | 81.4 | 70.3 | 214.4 | 142.4 | 72.0 | 11.5 | 24 | 46.7 | 49.3 | 27.1 | 123.1 | 82.7 | 41.4 | 6.9 | 3 | | | | | | |
| 1984 | 110.0 | 63.4 | 43.7 | 217.1 | 132.4 | 84.7 | 13.4 | 10 | 54.5 | 42.7 | 33.7 | 130.9 | 54.2 | 46.7 | 9.0 | 6 | 31.5 | 38.1 | 36.0 | 105.6 | 68.3 | 37.3 | 6.0 | 23 | | | | | | |
| 1985 | 78.0 | 72.9 | 39.6 | 190.5 | 127.3 | 63.2 | 10.2 | 12 | 36.5 | 42.0 | 40.8 | 119.3 | 80.3 | 39.0 | 5.6 | 6 | 35.4 | 23.7 | 31.7 | 90.8 | 59.7 | 31.1 | 5.6 | 9 | | | | | | |
| 1986 | 94.0 | 88.4 | 80.7 | 263.1 | 171.7 | 91.4 | 11.5 | 9 | 57.8 | 41.5 | 35.5 | 134.8 | | | 11.0 | 1 | 34.7 | 31.0 | 32.3 | 98.0 | 63.2 | 34.8 | 5.0 | 8 | | | | | | |
| 1987 | 66.9 | 59.2 | 66.1 | 192.2 | 131.2 | 61.0 | 14.4 | 5 | 47.5 | 48.1 | 52.7 | 149.3 | 95.0 | 53.3 | 7.0 | 22 | 27.6 | 22.9 | 30.2 | 80.7 | 56.2 | 24.5 | 4.5 | 23 | | | | | | |
| 1988 | 59.1 | 37.3 | 33.5 | 129.9 | 84.0 | 45.9 | 8.4 | 1 | 35.0 | 19.5 | 17.8 | 72.3 | 47.8 | 24.5 | 5.0 | 6 | 12.7 | 10.0 | 15.0 | 37.7 | 24.9 | 12.8 | 2.9 | 10 | | | | | | |
| 1989 | 51.9 | 63.3 | 52.2 | 167.4 | 111.8 | 55.6 | 8.7 | 21 | | | | | | | | | 48.5 | 30.1 | 25.2 | 103.8 | 71.4 | 25.8 | 6.7 | 4 | | | | | | |
| 1990 | 76.6 | 60.4 | 60.5 | 197.5 | 126.0 | 71.5 | 9.8 | 3 | 53.8 | 34.2 | 36.8 | 124.8 | 84.7 | 40.5 | 7.2 | 1 | 29.8 | 22.6 | 22.9 | 75.3 | 53.0 | 22.3 | 3.5 | 7 | | | | | | |
| 1991 | 79.2 | 81.6 | 55.7 | 216.5 | 136.2 | 80.3 | 10.0 | 13 | 52.8 | 50.1 | 49.5 | 162.4 | 100.5 | 51.9 | 7.8 | 10 | 30.2 | 24.8 | 28.0 | 83.0 | 57.7 | 25.3 | 4.6 | 2 | | | | | | |
| 1992 | 85.7 | 67.5 | 84.7 | 237.9 | 147.1 | 90.8 | 10.2 | 7 | 58.0 | 36.4 | 31.1 | 125.5 | 81.8 | 43.7 | 7.3 | 7 | 26.9 | 24.0 | 14.7 | 65.6 | 45.7 | 19.9 | 3.5 | 8 | | | | | | |
| 1993 | 54.8 | 50.2 | 49.4 | 154.4 | 102.8 | 51.6 | 7.6 | 30 | 64.1 | 37.8 | 27.3 | 129.2 | 87.9 | 41.3 | 8.1 | 4 | 34.8 | 34.1 | 20.6 | 89.5 | 58.7 | 30.6 | 4.9 | 1 | | | | | | |
| 1994 | 57.8 | 59.7 | 60.3 | 177.8 | 117.0 | 60.8 | 8.1 | 30 | 61.4 | 40.6 | 36.1 | 138.1 | 90.8 | 47.3 | 9.7 | 4 | 23.8 | 19.6 | 22.2 | 65.6 | 43.9 | 21.7 | 3.8 | 29 | | | | | | |
| MEAN | 75.1 | 64.9 | 59.3 | 199.3 | 129.3 | 70.8 | 10.3 | 10.8 | 53.0 | 44.5 | 42.5 | 140.1 | 89.7 | 45.6 | 8.1 | 9.5 | 32.1 | 26.9 | 26.0 | 88.6 | 57.1 | 27.5 | 4.9 | 9.9 | | | | | | |
| MAX | 110.0 | 107.7 | 103.8 | 318.5 | 193.6 | 124.9 | 14.4 | 30.0 | 74.8 | 81.4 | 81.3 | 214.4 | 142.4 | 72.0 | 11.5 | 24.0 | 69.1 | 49.3 | 37.9 | 153.4 | 101.1 | 52.3 | 7.6 | 29.0 | | | | | | |
| MIN | 38.0 | 37.3 | 33.5 | 120.3 | 77.3 | 43.0 | 7.1 | 1.0 | 30.5 | 19.5 | 17.8 | 72.3 | 34.0 | 13.6 | 5.0 | 1.0 | 12.7 | 10.0 | 14.7 | 65.6 | 24.9 | 12.8 | 2.9 | 1.0 | | | | | | |

TABLE A.3-10 DAILY EVAPORATION (PICHE) REGISTERED AT PAKSE STATION (3/4)

| YEAR | JULY | | | | | | | | | | AUGUST | | | | | | | | | | SEPTEMBER | | | | | | | | | |
|------|----------------|----------|----------|-----------|-------------|-----------|------|----------|----------|------|----------|----------|------|-----------|-------------|-----------|------|----------|----------|-------|-----------|----------|-----|-----------|-------------|-----------|------|----------|----------|----|
| | 11 to 21 MONTH | | | Total Day | Total Night | Max Daily | Date | 10 to 20 | | | 21 to 30 | | | Total Day | Total Night | Max Daily | Date | 10 to 20 | | | 21 to 30 | | | Total Day | Total Night | Max Daily | Date | | | |
| | 11 to 20 | 21 to 30 | 11 to 20 | | | | | 21 to 30 | 10 to 19 | 20 | 21 to 30 | 10 to 19 | 20 | | | | | 21 to 30 | 10 to 19 | 20 | 21 to 30 | 10 to 19 | 20 | | | | | 21 to 30 | 10 to 19 | 20 |
| 1967 | 23.5 | 22.5 | 26.7 | 72.7 | 52.2 | 20.5 | 4.7 | 22 | 23.7 | 24.4 | 18.9 | 67.0 | 50.7 | 16.3 | 4.0 | 15-13 | 17.3 | 11.3 | 14.0 | 42.6 | 34.4 | 8.2 | 2.7 | 8 | | | | | | |
| 1968 | 27.1 | 32.8 | 24.8 | 84.7 | 54.7 | 30.0 | 4.5 | 30 days | 24.2 | 13.7 | 20.8 | 58.7 | 40.8 | 18.5 | 3.0 | 23 | 13.8 | 22.0 | 26.3 | 62.1 | 43.3 | 18.8 | 6.3 | 30 | | | | | | |
| 1969 | 21.8 | 19.4 | 18.5 | 59.7 | 42.7 | 17.0 | 3.2 | 6-14 | 18.5 | 23.8 | 29.1 | 71.4 | 52.7 | 18.7 | 3.7 | 31 | 20.6 | 20.0 | 24.8 | 65.4 | 47.6 | 17.8 | 4.2 | 10 | | | | | | |
| 1970 | 25.1 | 26.4 | 31.4 | 82.9 | 56.5 | 24.4 | 4.0 | 1 | 20.8 | 17.1 | 20.1 | 58.0 | 39.9 | 18.1 | 3.5 | 31 | 16.9 | 24.2 | 20.2 | 61.3 | 42.5 | 18.8 | 3.7 | 30 | | | | | | |
| 1971 | 25.5 | 22.9 | 30.7 | 79.1 | 55.2 | 23.9 | 4.9 | 22 | 22.4 | 19.7 | 26.0 | 68.1 | 47.5 | 20.6 | 3.1 | 3 | 29.3 | 26.0 | 19.4 | 74.7 | 48.0 | 26.7 | 4.5 | 1 | | | | | | |
| 1972 | 19.4 | 24.3 | 28.1 | 69.8 | 48.0 | 21.8 | 3.8 | 24 | 17.2 | 23.2 | 22.7 | 63.1 | 43.9 | 19.2 | 3.2 | 11 | 16.7 | 22.3 | 23.7 | 62.7 | 46.0 | 16.7 | 4.1 | 1 | | | | | | |
| 1973 | 20.0 | 22.4 | 40.7 | 82.1 | 58.8 | 23.3 | 5.2 | 20 | 28.3 | 21.3 | 27.8 | 77.4 | 56.6 | 20.8 | 4.4 | 2 | 32.2 | 28.8 | 39.6 | 98.6 | 71.5 | 27.1 | 7.3 | 24 | | | | | | |
| 1974 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1975 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1976 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1977 | 28.5 | 32.2 | 40.5 | 101.2 | 66.3 | 34.9 | 6.1 | 31 | 33.2 | 32.3 | 26.1 | 91.6 | 63.8 | 27.8 | 6.1 | 13 | 19.5 | 24.7 | 43.0 | 87.2 | 62.7 | 24.5 | 6.3 | 25 | | | | | | |
| 1978 | 26.0 | 27.7 | 24.9 | 78.6 | 49.5 | 29.2 | 3.8 | 13 | 21.6 | 18.2 | 28.7 | 68.5 | 45.8 | 22.7 | 3.4 | 12 | 25.6 | 15.7 | 24.3 | 65.6 | 46.2 | 19.4 | 3.9 | 24 | | | | | | |
| 1979 | 20.8 | 27.7 | 32.0 | 80.5 | 51.2 | 29.3 | 3.7 | 22 | 12.9 | 27.5 | 31.7 | 72.1 | 49.2 | 22.9 | 3.6 | 14 | 27.5 | 27.6 | 17.3 | 72.4 | 49.7 | 22.7 | 3.8 | 5 | | | | | | |
| 1980 | 30.6 | 30.2 | 30.1 | 90.9 | 61.9 | 29.0 | 4.6 | 31 | 30.7 | 29.1 | 20.0 | 79.8 | 53.3 | 26.5 | 3.7 | 5-11 | 15.7 | 18.0 | 23.6 | 57.3 | 42.1 | 15.2 | 3.5 | 24 | | | | | | |
| 1981 | 29.4 | 25.0 | 30.3 | 84.7 | 58.3 | 26.4 | 4.5 | 5 | 20.1 | 27.8 | 33.8 | 81.7 | 54.5 | 27.2 | 4.6 | 19 | 34.0 | 33.8 | 33.5 | 101.3 | 73.5 | 27.8 | 5.0 | 24 | | | | | | |
| 1982 | 34.3 | 24.3 | 37.4 | 96.0 | 64.8 | 31.2 | 5.5 | 29 | 24.5 | 27.3 | 26.0 | 77.8 | 51.7 | 26.1 | 4.2 | 7 | 17.0 | 25.3 | 22.2 | 64.5 | 46.5 | 18.0 | 3.8 | 13 | | | | | | |
| 1983 | 40.5 | 28.8 | 38.8 | 108.1 | 71.6 | 36.5 | 5.0 | 21-24 | 24.3 | 27.8 | 31.3 | 83.4 | 57.7 | 25.7 | 3.9 | 12 | 30.5 | 31.5 | 28.0 | 90.0 | 65.1 | 24.9 | 4.3 | 20 | | | | | | |
| 1984 | 25.0 | 28.5 | 29.6 | 83.1 | 55.6 | 27.5 | 4.2 | 23 | 21.0 | 10.9 | 20.0 | 51.9 | 35.6 | 16.3 | 3.1 | 5 | 20.6 | 34.0 | 30.9 | 85.5 | 62.8 | 22.7 | 6.3 | 29 | | | | | | |
| 1985 | 25.3 | 31.9 | 39.3 | 95.5 | 66.9 | 28.6 | 5.1 | 15 | 22.4 | 22.8 | 29.0 | 74.2 | 54.9 | 22.7 | 4.4 | 27 | 23.4 | 22.8 | 33.5 | 79.7 | 57.1 | 22.6 | 4.6 | 28 | | | | | | |
| 1986 | 33.8 | 21.5 | 35.3 | 90.6 | 60.1 | 30.5 | 5.8 | 1 | 27.0 | 21.0 | 18.2 | 66.2 | 44.4 | 21.8 | 4.6 | 1 | 22.0 | 42.4 | 35.3 | 99.7 | 72.9 | 26.8 | 5.9 | 20 | | | | | | |
| 1987 | 16.5 | 20.6 | 31.5 | 68.6 | 47.4 | 21.2 | 4.7 | 26 | 30.0 | 22.6 | 20.3 | 72.9 | 51.2 | 21.7 | 3.7 | 5 | 18.4 | 21.1 | 21.6 | 61.1 | 45.2 | 15.9 | 3.0 | 12 | | | | | | |
| 1988 | 14.7 | 14.5 | 10.4 | 39.6 | 31.7 | 14.9 | 2.1 | 24 | 13.4 | 22.6 | 26.6 | 62.6 | 42.8 | 19.8 | 3.1 | 18 | 27.9 | 23.7 | 24.4 | 76.0 | 53.3 | 22.1 | 3.5 | 4 | | | | | | |
| 1989 | 22.2 | 19.9 | 18.1 | 60.2 | 42.6 | 17.6 | 3.0 | 7 | 16.0 | 19.5 | 20.7 | 56.2 | 39.9 | 16.3 | 2.9 | 15 | 15.1 | 14.7 | 24.0 | 53.8 | 39.2 | 14.6 | 3.1 | 27-28 | | | | | | |
| 1990 | 26.8 | 28.3 | 24.6 | 79.7 | 54.7 | 25.0 | 3.6 | 19-27 | 27.1 | 26.1 | 26.7 | 79.9 | 56.9 | 23.0 | 3.8 | 10 | 21.7 | 22.2 | 24.6 | 68.5 | 49.5 | 19.0 | 3.9 | 1 | | | | | | |
| 1991 | 25.7 | 21.5 | 19.7 | 66.9 | 45.0 | 21.9 | 3.9 | 2 | 20.7 | 18.0 | 14.9 | 53.6 | 36.2 | 17.4 | 3.6 | 11 | 15.3 | 19.6 | 20.4 | 55.3 | 42.6 | 12.7 | 3.2 | 24 | | | | | | |
| 1992 | 23.1 | 28.6 | 18.9 | 70.6 | 49.3 | 21.3 | 3.6 | 12 | 24.4 | 14.0 | 13.7 | 52.1 | 35.5 | 16.6 | 4.2 | 8 | 17.2 | 20.3 | 17.6 | 55.1 | 40.2 | 14.9 | 2.7 | 24 | | | | | | |
| 1993 | 24.9 | 21.1 | 26.1 | 72.1 | 50.3 | 21.8 | 3.2 | 6 | 18.7 | 19.9 | 20.6 | 59.2 | 43.5 | 15.7 | 3.1 | 11 | 17.7 | 17.9 | 22.8 | 58.4 | 43.1 | 15.3 | 3.0 | 24 | | | | | | |
| 1994 | 22.0 | 18.7 | 21.1 | 61.8 | 43.4 | 18.4 | 3.0 | 22 | 21.5 | 26.0 | 17.0 | 64.5 | 45.8 | 18.7 | 3.5 | 10 | 15.8 | 15.4 | 19.4 | 50.6 | 35.2 | 15.4 | 2.6 | 29 | | | | | | |
| MEAN | 25.3 | 24.9 | 28.3 | 80.0 | 53.6 | 25.0 | 4.2 | 17.0 | 22.6 | 22.3 | 23.6 | 68.5 | 47.8 | 20.8 | 3.9 | | | | | | | | | | | | | | | |
| MAX | 40.5 | 32.8 | 40.7 | 108.1 | 71.6 | 36.5 | 6.1 | 31.0 | 33.2 | 32.3 | 26.1 | 91.6 | 63.8 | 27.8 | 6.1 | | | | | | | | | | | | | | | |
| MIN | 14.7 | 14.5 | 10.4 | 39.6 | 31.7 | 14.9 | 2.1 | 1.0 | 12.9 | 10.9 | 13.7 | 51.9 | 35.5 | 15.7 | 2.9 | | | | | | | | | | | | | | | |

TABLE A.3-10 DAILY EVAPORATION (PICHE) REGISTERED AT PAKSE STATION (4/4)

| YEAR | OCTOBER | | | | | | | | | | | | NOVEMBER | | | | | | | | | | | | DECEMBER | | | | | | | | | | | | MAXIMUM EVAPORATION | | |
|------|---------|----------|----------|-------|-----------|-------------|-----------|---------|---------|----------|----------|-------|-----------|-------------|-----------|--------|---------|----------|----------|-------|-----------|-------------|-----------|------|-----------------|-------------------|-------------------|------|--|--|--|--|--|--|--|--|---------------------|--|--|
| | 1 to 10 | 11 to 20 | 21 to 30 | MONTH | Total Day | Total Night | Max Daily | Date | 1 to 10 | 11 to 20 | 21 to 30 | MONTH | Total Day | Total Night | Max Daily | Date | 1 to 10 | 11 to 20 | 21 to 30 | MONTH | Total Day | Total Night | Max Daily | Date | TOTAL MONTH DAY | TOTAL MONTH NIGHT | MAX. DAILY (24hr) | | | | | | | | | | | | |
| 1967 | 27.3 | 34.7 | 38.9 | 100.9 | 80.0 | 20.9 | 4.8 | 19 | 41.7 | 35.1 | 38.0 | 114.8 | 91.3 | 23.5 | 6.0 | 3 | 46.5 | 48.1 | 62.2 | 156.8 | 110.3 | 48.5 | 10.5 | 29 | 235.4 | 182.5 | 72.9 | 10.5 | | | | | | | | | | | |
| 1968 | 29.7 | 27.0 | 41.0 | 97.7 | 76.5 | 21.2 | 4.5 | 2 Days | 32.9 | 37.8 | 50.3 | 121.0 | 92.4 | 28.6 | 7.1 | 27 | 41.7 | 49.5 | 49.8 | 141.0 | 107.8 | 33.2 | 7.2 | 22 | 225.5 | 137.5 | 88.0 | 9.9 | | | | | | | | | | | |
| 1969 | 48.6 | 49.5 | 48.5 | 146.6 | 109.0 | 37.6 | 6.3 | 9 | 42.8 | 34.6 | 49.9 | 127.3 | 90.4 | 36.9 | 7.3 | 25 | 48.1 | 49.5 | 48.3 | 145.9 | 108.5 | 37.4 | 5.3 | 9 | 217.8 | 140.6 | 77.2 | 9.6 | | | | | | | | | | | |
| 1970 | 31.8 | 31.7 | 32.7 | 96.2 | 64.4 | 31.8 | 5.4 | 3 | 36.3 | 27.2 | 24.0 | 87.5 | 55.2 | 32.3 | 5.0 | 5 | 23.5 | 35.3 | 45.4 | 104.2 | 71.8 | 32.4 | 6.2 | 26 | 218.1 | 135.2 | 82.9 | 17.2 | | | | | | | | | | | |
| 1971 | 31.5 | 37.7 | 37.6 | 106.8 | 69.5 | 36.3 | 6.7 | 13 | 36.9 | 59.5 | 49.0 | 145.4 | 93.8 | 51.6 | 6.8 | 21 | 45.0 | 51.1 | 46.3 | 142.4 | 91.5 | 50.9 | 6.3 | 11 | 172.8 | 106.7 | 66.1 | 7.8 | | | | | | | | | | | |
| 1972 | 20.7 | 21.8 | 34.2 | 76.8 | 57.5 | 19.3 | 4.0 | 27 | 32.1 | 32.4 | 28.2 | 92.7 | 66.0 | 26.7 | 5.3 | 14 | 33.1 | 33.9 | 43.0 | 115.0 | 85.6 | 29.4 | 6.3 | 19 | 175.4 | 115.6 | 83.4 | 9.4 | | | | | | | | | | | |
| 1973 | 37.3 | 42.2 | 54.3 | 133.8 | 95.3 | 38.5 | 6.1 | 12 | | | | | | | | | | | | | | | | | 185.3 | 118.2 | 67.1 | 9.0 | | | | | | | | | | | |
| 1974 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1975 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1976 | 30.8 | 34.9 | 34.0 | 99.7 | 76.9 | 22.8 | 4.7 | 19 | 31.9 | 57.6 | 64.5 | 154.0 | 113.5 | 40.5 | 8.7 | 20 | 51.7 | 48.7 | 72.7 | 173.1 | 126.1 | 47.0 | 8.3 | 28 | 173.1 | 126.1 | 47.0 | 8.7 | | | | | | | | | | | |
| 1977 | 32.5 | 36.0 | 42.8 | 111.3 | 84.4 | 26.9 | 5.2 | 21 | 49.0 | 64.0 | 49.0 | 182.0 | 112.1 | 49.9 | 8.2 | 16 | 46.4 | 43.7 | 62.4 | 152.5 | 107.4 | 45.1 | 6.9 | 1 | 276.6 | 180.6 | 96.0 | 15.2 | | | | | | | | | | | |
| 1978 | 29.9 | 50.0 | 42.9 | 122.8 | 84.3 | 38.5 | 8.4 | 29 | 35.7 | 41.3 | 46.4 | 123.4 | 85.2 | 38.2 | 6.6 | 30 | 54.3 | 50.1 | 52.1 | 156.5 | 108.5 | 48.0 | 7.8 | 4 | 210.8 | 142.8 | 69.1 | 11.8 | | | | | | | | | | | |
| 1979 | 49.3 | 49.1 | 57.3 | 155.7 | 110.0 | 45.7 | 8.3 | 21 | 55.3 | 66.1 | 69.8 | 191.2 | 134.4 | 56.8 | 8.9 | 27 | 56.5 | 58.1 | 68.3 | 182.9 | 129.5 | 53.4 | 8.6 | 1 | 290.6 | 175.3 | 115.3 | 16.7 | | | | | | | | | | | |
| 1980 | 29.7 | 31.6 | 28.7 | 90.0 | 66.7 | 23.3 | 5.2 | 5 | 34.4 | 38.1 | 39.2 | 111.7 | 83.2 | 28.5 | 5.6 | 13 | 41.0 | 47.9 | 56.1 | 145.0 | 103.7 | 41.4 | 7.3 | 22 | 288.9 | 187.3 | 101.6 | 11.9 | | | | | | | | | | | |
| 1981 | 24.0 | 28.2 | 52.7 | 104.9 | 74.5 | 30.4 | 6.5 | 23 | 45.8 | 36.5 | 52.3 | 134.6 | 93.0 | 41.6 | 7.9 | 2 Days | 66.0 | 62.9 | 63.3 | 192.2 | 124.6 | 67.6 | 8.8 | 6 | 302.1 | 193.0 | 109.1 | 12.9 | | | | | | | | | | | |
| 1982 | 33.6 | 36.3 | 33.1 | 103.0 | 74.0 | 29.0 | 5.2 | 15 | 46.6 | 42.2 | 45.6 | 134.4 | 96.0 | 36.4 | 6.9 | 10 | 55.9 | 70.7 | 66.8 | 193.4 | 132.6 | 60.8 | 10.5 | 11 | 303.9 | 196.0 | 107.9 | 12.9 | | | | | | | | | | | |
| 1983 | 23.1 | 23.6 | 27.2 | 73.9 | 53.3 | 20.6 | 3.6 | 18-20-2 | 18.3 | 21.5 | 65.8 | 105.6 | 71.8 | 33.8 | 8.4 | 26 | 59.9 | 60.8 | 64.9 | 185.6 | 122.8 | 62.8 | 8.2 | 8 | 318.5 | 193.6 | 124.9 | 13.3 | | | | | | | | | | | |
| 1984 | 26.4 | 30.7 | 52.8 | 109.9 | 74.9 | 35.0 | 6.2 | 31 | 37.7 | 36.6 | 50.7 | 125.0 | 85.0 | 40.0 | 6.3 | 29 | 50.6 | 49.3 | 70.9 | 170.8 | 117.4 | 53.4 | 8.2 | 23 | 275.9 | 170.4 | 105.5 | 13.4 | | | | | | | | | | | |
| 1985 | 49.0 | 32.1 | 39.0 | 120.1 | 98.7 | 30.4 | 7.3 | 5 | 41.3 | 41.1 | 43.1 | 125.5 | 90.0 | 35.5 | 6.3 | 24 | 45.0 | 66.0 | 67.8 | 178.8 | 123.4 | 55.4 | 8.4 | 15 | 261.0 | 160.9 | 100.1 | 10.5 | | | | | | | | | | | |
| 1986 | 40.1 | 32.6 | 37.8 | 110.3 | 80.1 | 30.2 | 5.4 | 10-30 | 46.2 | 37.7 | 52.6 | 136.5 | 93.6 | 42.9 | 7.7 | 29 | 52.8 | 55.3 | 41.9 | 150.0 | 102.4 | 47.6 | 7.4 | 19 | 288.2 | 186.3 | 101.9 | 11.8 | | | | | | | | | | | |
| 1987 | 22.6 | 25.5 | 37.9 | 86.0 | 60.0 | 26.0 | 5.7 | 27 | 28.2 | 22.6 | 36.0 | 86.8 | 60.9 | 25.7 | 6.9 | 30 | 46.4 | 60.0 | 57.7 | 164.1 | 108.3 | 55.8 | 8.0 | 20 | 233.3 | 146.6 | 86.7 | 14.4 | | | | | | | | | | | |
| 1988 | 17.2 | 21.4 | 43.7 | 82.3 | 57.4 | 24.0 | 5.8 | 29 | 55.4 | 45.5 | 49.9 | 150.8 | 104.4 | 46.4 | 7.0 | 18 | 58.8 | 59.1 | 68.8 | 186.7 | 126.4 | 60.3 | 9.7 | 11 | 240.3 | 147.3 | 93.0 | 10.0 | | | | | | | | | | | |
| 1989 | 27.2 | 30.2 | 40.8 | 98.2 | 74.7 | 23.3 | 7.3 | 21 | 37.8 | 46.8 | 51.8 | 136.4 | 57.6 | 78.8 | 6.3 | 19 | 46.4 | 47.8 | 52.2 | 146.4 | 106.8 | 39.6 | 7.4 | 1 | 194.3 | 120.6 | 76.8 | 9.7 | | | | | | | | | | | |
| 1990 | 26.3 | 28.4 | 41.5 | 96.2 | 72.5 | 23.7 | 5.4 | 11 | 33.9 | 33.1 | 41.7 | 108.7 | 78.3 | 30.4 | 6.0 | 25 | 52.2 | 42.2 | 49.6 | 144.0 | 103.4 | 40.6 | 8.2 | 1 | 197.5 | 126.0 | 71.5 | 9.8 | | | | | | | | | | | |
| 1991 | 14.6 | 20.7 | 30.4 | 65.7 | 50.5 | 15.2 | 9.4 | 30 | 32.2 | 47.0 | 37.5 | 116.7 | 89.9 | 27.8 | 6.1 | 14 | 48.3 | 43.5 | 43.9 | 135.7 | 96.8 | 36.9 | 7.9 | 1 | 216.5 | 136.2 | 80.3 | 10.0 | | | | | | | | | | | |
| 1992 | 18.3 | 36.3 | 36.8 | 91.4 | 61.3 | 30.1 | 5.6 | 27 | 39.4 | 45.6 | 52.7 | 137.7 | 92.9 | 44.8 | 6.7 | 20 | 43.9 | 52.6 | 60.0 | 156.5 | 108.9 | 47.6 | 7.4 | 16 | 237.9 | 147.1 | 90.8 | 10.2 | | | | | | | | | | | |
| 1993 | 30.0 | 30.6 | 32.7 | 93.3 | 65.9 | 27.4 | 5.6 | 31 | 43.9 | 38.1 | 48.9 | 131.9 | 95.4 | 36.5 | 6.6 | 26 | 43.9 | 52.6 | 60.0 | 156.5 | 108.9 | 47.6 | 7.4 | 16 | 175.4 | 115.6 | 83.4 | 9.4 | | | | | | | | | | | |
| 1994 | 22.7 | 25.3 | 55.0 | 103.0 | 73.5 | 29.5 | 6.5 | 22 | 51.6 | 41.3 | 45.6 | 139.5 | 100.2 | 38.3 | 6.3 | 10 | 37.4 | 43.4 | 51.2 | 132.0 | 96.3 | 35.7 | 6.2 | 20 | 192.5 | 121.3 | 71.2 | 9.7 | | | | | | | | | | | |
| MEAN | 29.8 | 32.6 | 40.5 | 102.9 | 74.8 | 28.4 | 6.0 | | 39.5 | 41.2 | 47.3 | 128.0 | 89.1 | 38.9 | 6.8 | | 47.8 | 51.5 | 57.0 | 156.3 | 109.3 | 47.1 | 7.8 | | 234.9 | 149.5 | 86.8 | 11.3 | | | | | | | | | | | |
| MAX | 49.3 | 50.0 | 57.3 | 155.7 | 110.0 | 45.7 | 9.4 | | 55.4 | 66.1 | 69.8 | 191.2 | 134.4 | 78.8 | 8.9 | | 66.0 | 70.7 | 72.7 | 193.4 | 132.6 | 67.6 | 10.5 | | 318.5 | 196.0 | 124.9 | 17.2 | | | | | | | | | | | |
| MIN | 14.6 | 20.7 | 27.2 | 65.7 | 50.5 | 15.2 | 3.6 | | 18.3 | 21.5 | 24.0 | 86.8 | 55.2 | 23.5 | 5.0 | | 23.5 | 35.3 | 41.9 | 104.2 | 71.8 | 29.4 | 6.2 | | 172.8 | 106.7 | 47.0 | 7.8 | | | | | | | | | | | |

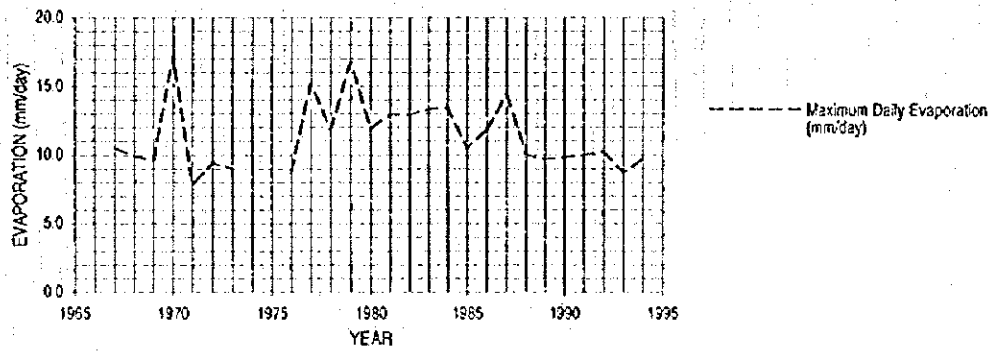
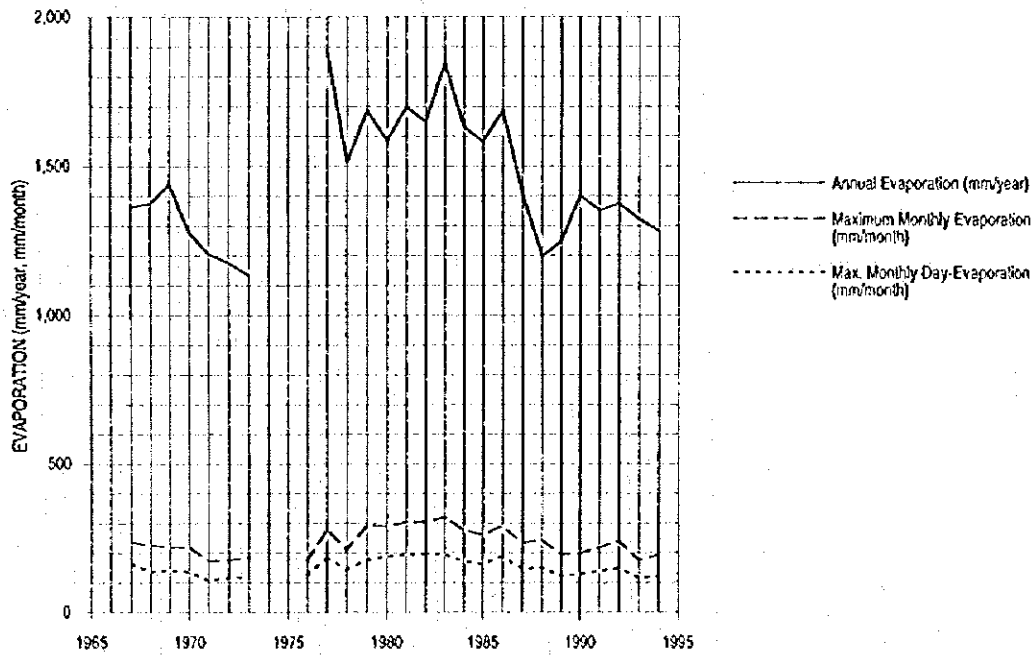


FIGURE A.3-11 EVAPORATION (PICHE) (1/2): ANNUAL VARIATION

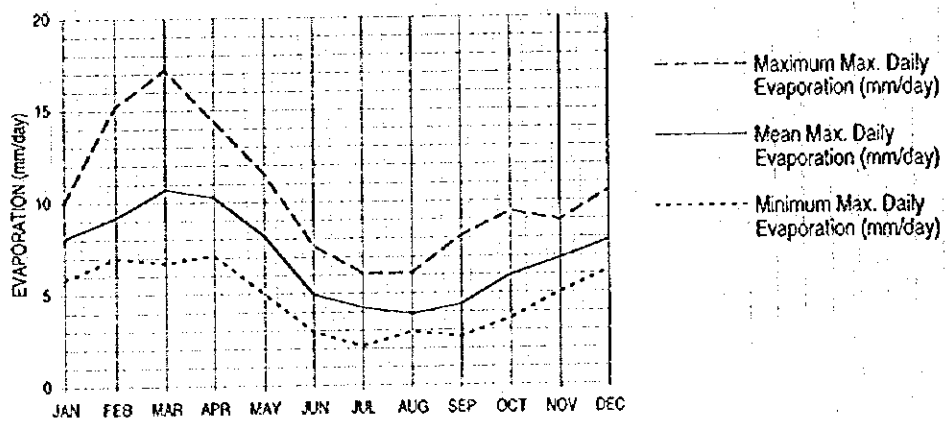
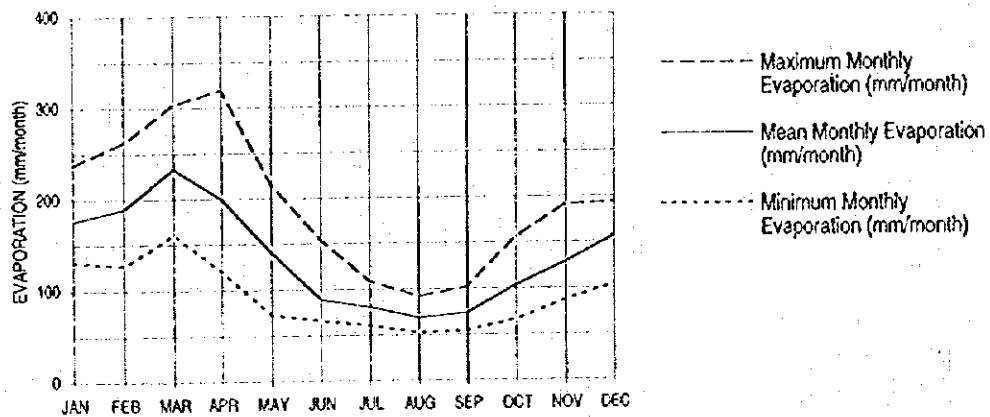


FIGURE A.3-11 EVAPORATION (PICHE) (2/2): MAXIMUM MONTHLY AND MAX.DAILY

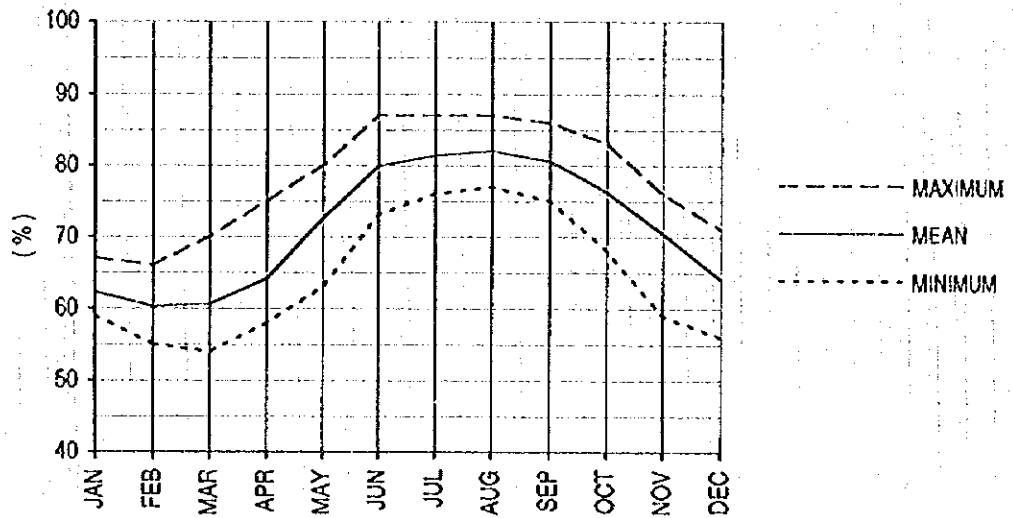
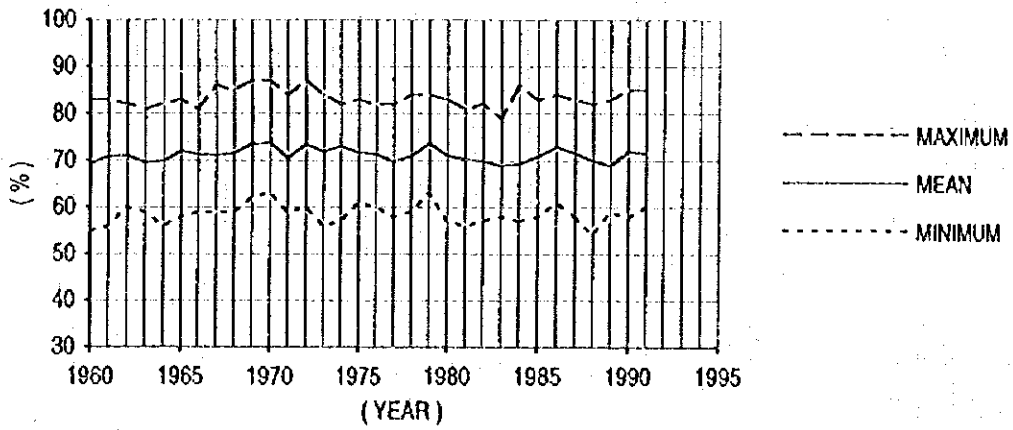


FIGURE A.3-12 HUMIDITY AT PAKSE STATION

TABLE A.3-12 MONTHLY AVERAGE OF DAILY MAXIMUM WIND VELOCITY

(Unit: m/sec)

| Year | Jan | | Feb | | Mar | | Apr | | May | | June | | July | | Aug | | Sept | | Oct | | Nov | | Dec | | Max | |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|------|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-------|-----|
| | Dir | Vel | Dir | Vel | Dir | Vel | Dir | Vel | Dir | Vel | Dir | Vel | Dir | Vel | Dir | Vel | Dir | Vel | Dir | Vel | Dir | Vel | Dir | Vel | Dir | Vel |
| 1957 | SE | 8 | SE | 7 | SE | 7 | SE | 5 | NNW | 7 | E | 5 | SE | 5 | SE | 5 | E | 5 | N | 5 | W | 5 | N | 7 | SE | 8 |
| 1958 | NE | 5 | SW | 7 | NE | 12 | NE | 12 | SE | 7 | NW | 5 | ESE | 5 | S | 5 | ESE | 5 | N | 8 | N | 7 | N | 9 | NE | 12 |
| 1959 | NE | 5 | SE | 7 | E | 7 | N | 9 | E | 7 | SE | 5 | E | 5 | N | 5 | E | 5 | N | 5 | N | 5 | NE | 20 | NE | 20 |
| 1960 | NE | 18 | SE | 10 | SE | 10 | N | 7 | SE | 4 | SW | 5 | SE | 3 | NW | 8 | S | 8 | N | 6 | N | 6 | N | 5 | NE | 18 |
| 1961 | N | 15 | SE | 8 | SE | 9 | SSE | 10 | S | 8 | SE | 6 | SW | 9 | SE | 5 | SE | 4 | NNE | 10 | NE | 4 | SE | 10 | N | 15 |
| 1962 | NE | 10 | NE | 9 | SE | 9 | S | 10 | SE | 10 | S | 8 | SW | 9 | SSE | 6 | SSE | 8 | NE | 8 | NE | 11 | NE | 7 | NE | 11 |
| 1963 | NE | 9 | NE | 9 | NE | 12 | NE | 10 | W | 10 | W | 9 | SE | 9 | SW | 10 | SE | 7 | NE | 8 | SE | 10 | NE | 9 | NE | 12 |
| 1964 | SE | 8 | N | 7 | SE | 8 | SSE | 9 | SE | 6 | SE | 6 | SW | 8 | SSE | 8 | W | 10 | E | 8 | ENE | 11 | NE | 9 | ENE | 11 |
| 1965 | S | 7 | SSE | 6 | NE | 7 | E | 6 | SE | 6 | WSW | 6 | SSE | 6 | SE | 6 | SE | 6 | N | 5 | NE | 8 | NE | 15 | NE | 15 |
| 1966 | S | 7 | SSE | 8 | SE | 7 | S | 7 | SSE | 15 | NNW | 9 | SW | 6 | S | 7 | S | 6 | NE | 8 | NE | 8 | NE | 9 | SSE | 15 |
| 1967 | NE | 13 | ENE | 9 | S | 9 | S | 8 | SE | 8 | SE | 7 | S | 7 | S | 5 | S | 6 | N | 7 | NE | 4 | NE | 8 | ENE | 13 |
| 1968 | NE | 8 | S | 8 | S | 10 | SE | 6 | SE | 8 | SE | 7 | SE | 7 | W | 8 | SE | 7 | S | 5 | S | 6 | N | 6 | SW | 11 |
| 1969 | SE | 5 | SE | 7 | SE | 7 | NNE | 8 | SE | 8 | W | 7 | S | 7 | W | 8 | SE | 7 | SE | 5 | SE | 8 | NE | 8 | SENE | 8 |
| 1970 | NE | 7 | NE | 6 | SE | 6 | SE | 6 | SE | 6 | SE | 6 | W | 5 | SE | 4 | SE | 4 | N | 8 | NE | 6 | N | 6 | SE | 9 |
| 1971 | N | 7 | NE | 5 | NW | 8 | NNW | 16 | E | 12 | N | 13 | NNW | 8 | SE | 11 | SE | 4 | NE | 10 | NE | 15 | N | 6 | NNW | 16 |
| 1972 | N | 12 | NW | 13 | N | 10 | E | 18 | SW | 10 | W | 5 | S | 10 | S | 5 | S | 6 | E | 5 | NE | 5 | NE | 13 | E | 18 |
| 1973 | N | 4 | SE | 4 | SE | 5 | SE | 4 | SE | 5 | SE | 15 | SE | 10 | S | 6 | SE | 5 | NW | 10 | NE | 8 | NE | 10 | SE | 15 |
| 1974 | N | 5 | N | 11 | NNW | 40 | W | 14 | W | 7 | NW | 14 | WSW | 9 | NW | 7 | SE | 8 | N | 7 | SE | 5 | SE | 8 | SE | 9 |
| 1975 | N | 12 | ENE | 8 | NE | 8 | WSW | 13 | S | 13 | SW | 10 | SE | 8 | W | 10 | SE | 13 | NE | 12 | NE | 14 | N | 15 | NNE | 11 |
| 1976 | NE | 12 | SE | 8 | NE | 13 | W | 40 | SW | 20 | SE | 13 | W | 10 | W | 10 | W | 10 | SSW | 8 | N | 7 | N | 15 | NNE | 11 |
| 1977 | N | 7 | NNE | 14 | NNE | 17 | SE | 12 | SSE | 15 | W | 17 | NNW | 20 | E | 12 | SSE | 10 | WNW | 9 | N | 14 | N | 9 | WNW | 20 |
| 1978 | NE | 10 | NE | 9 | SE | 25 | W | 23 | SE | 16 | NNE | 17 | SW | 21 | WSW | 13 | W | 13 | E | 13 | NNE | 10 | N | 12 | SE | 25 |
| 1979 | NE | 12 | NNE | 8 | SE | 9 | SW | 17 | SE | 24 | NNW | 12 | ESE | 13 | SE | 10 | S | 8 | N | 8 | NE | 11 | N | 8 | SE | 24 |
| 1980 | NE | 6 | N | 18 | SE | 8 | S | 21 | NW | 29 | SE | 12 | SE | 15 | E | 8 | SE | 15 | NE | 8 | NE | 6 | NE | 6 | NW | 29 |
| 1981 | NE | 14 | S | 9 | SE | 8 | SW | 25 | W | 20 | SE | 20 | SW | 12 | NW | 8 | SW | 20 | SE | 14 | NE | 12 | N | 10 | SW | 25 |
| 1982 | N | 7 | SE | 10 | SE | 10 | NNW | 8 | SW | 14 | NW | 10 | S | 14 | SE | 10 | SE | 8 | SE | 9 | N | 10 | N | 7 | WNW | 16 |
| 1983 | NE | 14 | SE | 8 | SE | 10 | SE | 10 | W | 30 | SW | 22 | SW | 8 | SE | 8 | SE | 8 | SE | 6 | SW | 9 | N | 10 | W | 30 |
| 1984 | N | 10 | N | 8 | SE | 8 | SW | 10 | SW | 12 | W | 12 | SE | 10 | SE | 8 | W | 8 | N | 7 | N | 8 | N | 9 | SWW | 12 |
| 1985 | NW | 7 | SSE | 8 | N | 7 | SE | 20 | W | 20 | SW | 10 | NW | 8 | SW | 20 | SE | 6 | S | 8 | N | 10 | NE | 14 | SW | 20 |
| 1986 | N | 7 | S | 7 | N | 10 | S | 18 | W | 10 | W | 10 | SE | 8 | SW | 15 | E | 18 | NW | 8 | N | 10 | N | 9 | S | 18 |
| 1987 | N | 8 | SE | 7 | SE | 25 | N | 16 | ESE | 10 | SSW | 11 | W | 10 | SSE | 7 | SSE | 10 | W | 10 | N | 10 | N | 10 | SE | 25 |
| 1988 | NE | 7 | SE | 8 | SE | 10 | SE | 10 | W | 10 | E | 8 | SE | 5 | W | 7 | S | 5 | NE | 7 | NE | 10 | N | 10 | NESE | 10 |
| 1989 | SE | 7 | SSE | 8 | NE | 10 | W | 10 | ESE | 12 | W | 8 | NNW | 12 | SE | 5 | W | 6 | NW | 7 | NE | 9 | NE | 9 | NNWSE | 12 |
| 1990 | SW | 7 | SE | 7 | NE | 18 | SE | 15 | NW | 8 | WSW | 7 | E | 15 | W | 10 | W | 10 | SW | 10 | W | 15 | NE | 9 | NE | 18 |
| 1991 | N | 4 | N | 7 | SE | 6 | SE | 6 | E | 12 | SE | 8 | NW | 10 | S | 6 | SE | 5 | NNE | 8 | N | 8 | N | 6 | E | 12 |
| 1992 | NE | 6 | SE | 8 | SE | 8 | NW | 10 | SE | 7 | SE | 5 | W | 8 | W | 4 | SE | 4 | N | 5 | N | 7 | N | 8 | NW | 10 |
| 1993 | N | 6 | SE | 6 | SE | 8 | SE | 12 | SW | 14 | W | 18 | SE | 5 | SE | 8 | SE | 8 | NE | 9 | NE | 6 | NE | 9 | W | 18 |
| 1994 | N | 5 | SE | 5 | N | 14 | SW | 8 | S | 7 | SE | 7 | W | 8 | W | 5 | W | 10 | NE | 9 | N | 5 | N | 13 | N | 14 |
| MAX | NE | 18 | N | 18 | NNW | 40 | W | 40 | W | 30 | SW | 22 | SW | 21 | SW | 20 | SW | 20 | SE | 14 | N | 15 | NE | 20 | NW | 40 |

Source: Ministry of Agriculture and Forestry, Pakse & Vientiane

TABLE A.3-13 MAXIMUM, MEAN AND FREQUENCY OF MAXIMUM WIND VELOCITY

| Max. Maximum | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW |
|--------------|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|
| Jan | 15 | | 18 | | | | 8 | | 7 | | 7 | | | | | 7 |
| Feb | 18 | 14 | 9 | 9 | | | 10 | 8 | 9 | | 7 | | | | | 13 |
| Mar | 14 | 17 | 18 | 7 | 7 | | 26 | | 10 | | | | | | 40 | 8 |
| Apr | 16 | 8 | 12 | | 18 | 12 | 24 | 15 | 13 | | 25 | 13 | 40 | 8 | 10 | 16 |
| May | | | | | 12 | 12 | 20 | 10 | 21 | | 20 | | 30 | | | 29 |
| Jun | 13 | 17 | | 8 | 20 | 20 | 20 | 8 | 11 | | 22 | 7 | 18 | 12 | 14 | 9 |
| Jul | | | | 15 | 14 | 13 | 15 | 6 | 14 | | 21 | 9 | 10 | 20 | 10 | 12 |
| Aug | 20 | | | 12 | 11 | 8 | 7 | | 7 | | 20 | 13 | 10 | | | 8 |
| Sep | | | | 18 | 5 | 15 | 10 | 8 | 8 | | 20 | 13 | | | | |
| Oct | 8 | 10 | 12 | 13 | | 14 | 14 | 8 | 8 | | 10 | | 10 | 9 | 10 | |
| Nov | 15 | 10 | 15 | 11 | | 14 | 14 | 6 | | | | | 15 | | | |
| Dec | 13 | 11 | 20 | | | 10 | | | | | | | | 16 | | |
| YEAR | 20 | 17 | 20 | 11 | 18 | 13 | 25 | 15 | 21 | 11 | 25 | 13 | 40 | 40 | 29 | 16 |

| Max. Mean | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW |
|-----------|-------|-------|-------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|-------|-------|-------|
| Jan | 7.79 | | 9.75 | | | | 6.67 | | 7.00 | | 7.00 | | | | | 7.00 |
| Feb | 10.20 | 11.00 | 7.60 | 8.50 | | | 7.29 | 7.50 | 8.00 | | 7.00 | | | | | 13.00 |
| Mar | 10.25 | 17.00 | 10.71 | 7.00 | | | 9.67 | 9.50 | | | | | | 40.00 | 8.00 | |
| Apr | 10.67 | 8.00 | 11.00 | 12.00 | | | 9.91 | 9.50 | 12.80 | | 15.00 | 13.00 | 21.75 | 8.00 | 10.00 | 16.00 |
| May | | | | 10.33 | 11.00 | | 9.62 | 15.00 | 9.33 | | 14.00 | | 15.29 | | 18.50 | 7.00 |
| Jun | 13.00 | 17.00 | | 6.50 | | | 8.50 | 11.00 | 7.50 | | 11.75 | 6.50 | 10.75 | 12.00 | 9.67 | 9.00 |
| Jul | | | | 10.00 | 9.00 | | 7.64 | 6.00 | 9.50 | | 10.43 | 9.00 | 8.20 | 20.00 | 9.00 | 10.00 |
| Aug | 12.50 | | | 10.00 | | | 7.27 | 7.00 | 5.67 | | 14.00 | 13.00 | 9.00 | | 7.67 | |
| Sep | | | | 9.33 | 5.00 | | 6.75 | 9.33 | 6.57 | 8.00 | 20.00 | | | | | |
| Oct | 6.50 | 9.00 | 8.78 | | | | 8.80 | | 6.50 | | 9.50 | | 10.00 | 9.00 | 8.33 | |
| Nov | 8.93 | 10.00 | 8.20 | 11.00 | | | 10.67 | | 6.00 | | | | 10.00 | | | |
| Dec | 8.44 | 11.00 | 10.71 | | | | 10.00 | | | | | | | 16.00 | | |
| YEAR | 8.64 | 11.44 | 9.51 | 9.33 | 9.39 | 9.00 | 8.42 | 8.93 | 8.14 | 9.50 | 12.38 | 9.60 | 11.59 | 17.50 | 10.00 | 10.40 |

| % | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW |
|------|----|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|
| Jan | 37 | 0 | 42 | 0 | 0 | 0 | 8 | 0 | 5 | 0 | 3 | 0 | 0 | 0 | 3 | 0 |
| Feb | 13 | 5 | 13 | 5 | 0 | 0 | 37 | 11 | 8 | 0 | 3 | 0 | 0 | 0 | 3 | 0 |
| Mar | 11 | 3 | 18 | 0 | 3 | 0 | 55 | 0 | 5 | 0 | 0 | 0 | 0 | 3 | 3 | 0 |
| Apr | 8 | 3 | 5 | 0 | 5 | 0 | 29 | 5 | 13 | 0 | 11 | 3 | 11 | 3 | 3 | 3 |
| May | 0 | 0 | 0 | 0 | 8 | 5 | 34 | 5 | 8 | 0 | 13 | 0 | 18 | 0 | 5 | 3 |
| Jun | 3 | 3 | 0 | 0 | 5 | 0 | 32 | 0 | 5 | 3 | 11 | 5 | 21 | 3 | 8 | 3 |
| Jul | 0 | 0 | 0 | 0 | 5 | 5 | 29 | 3 | 11 | 0 | 18 | 3 | 13 | 3 | 5 | 5 |
| Aug | 5 | 0 | 0 | 0 | 5 | 0 | 29 | 8 | 16 | 0 | 11 | 3 | 16 | 0 | 8 | 0 |
| Sep | 0 | 0 | 0 | 0 | 8 | 3 | 42 | 8 | 18 | 3 | 3 | 0 | 16 | 0 | 0 | 0 |
| Oct | 26 | 5 | 24 | 0 | 8 | 0 | 13 | 0 | 5 | 0 | 5 | 0 | 3 | 3 | 8 | 0 |
| Nov | 39 | 3 | 39 | 3 | 0 | 0 | 8 | 0 | 3 | 0 | 0 | 0 | 5 | 0 | 0 | 0 |
| Dec | 47 | 3 | 45 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 |
| YEAR | 16 | 2 | 15 | 1 | 4 | 1 | 27 | 3 | 8 | 0 | 6 | 1 | 9 | 1 | 4 | 1 |

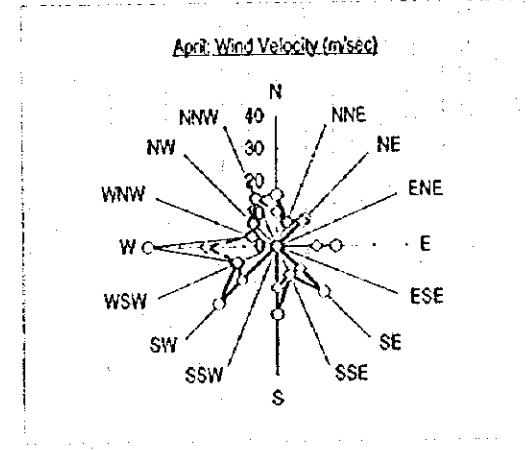
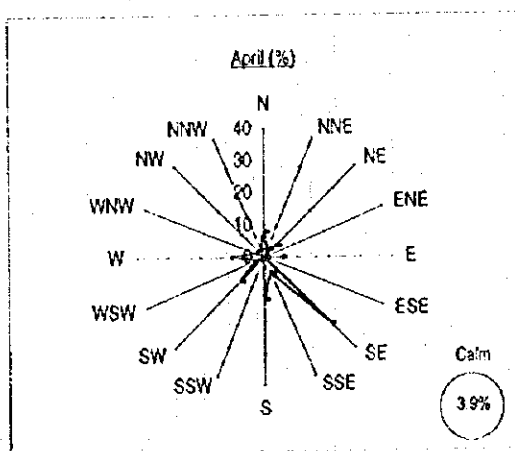
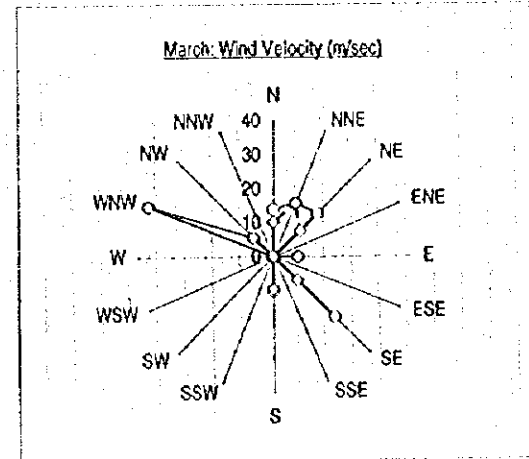
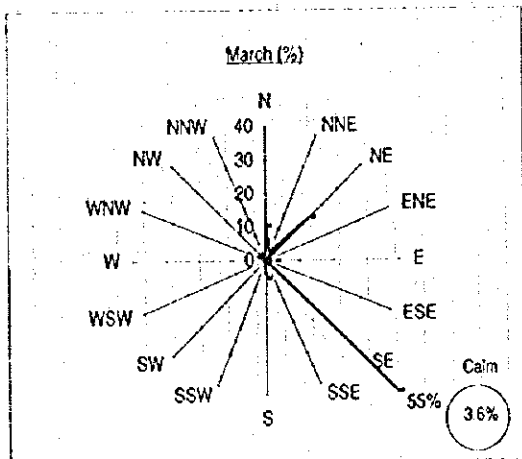
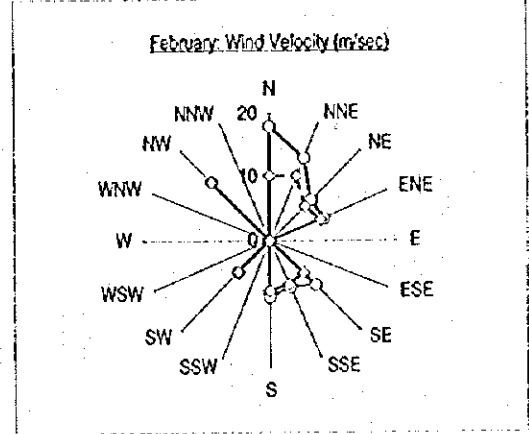
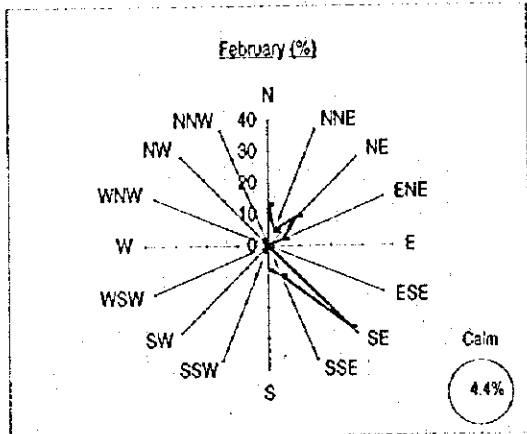
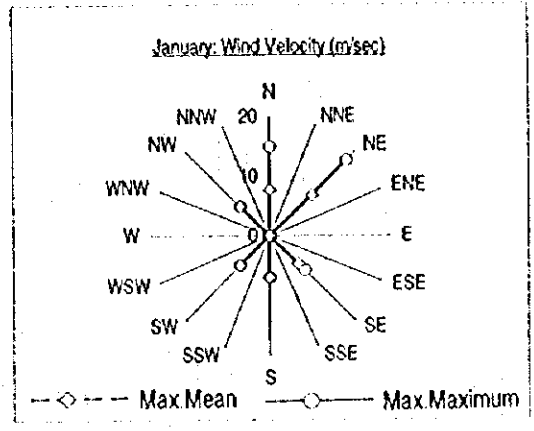
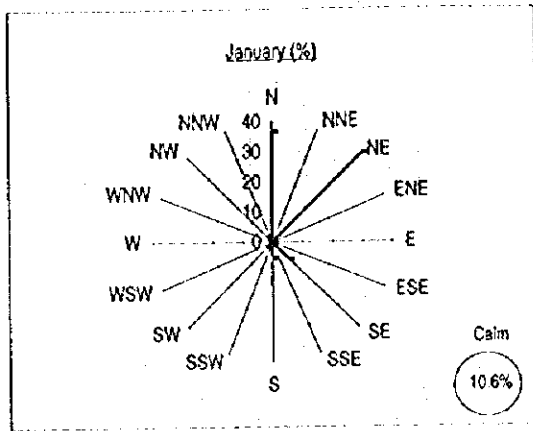


FIGURE A.3-13 WIND-ROSE: FREQUENCY AND MAXIMUM WIND VELOCITY (1/3)

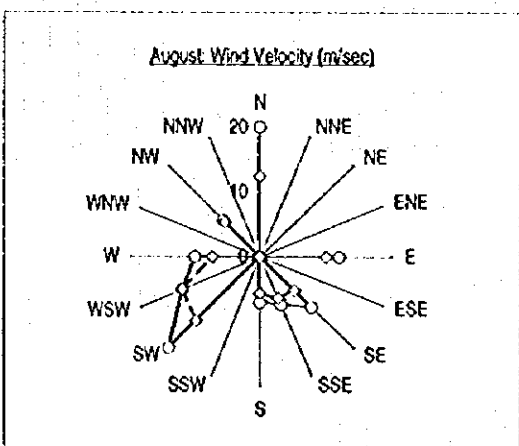
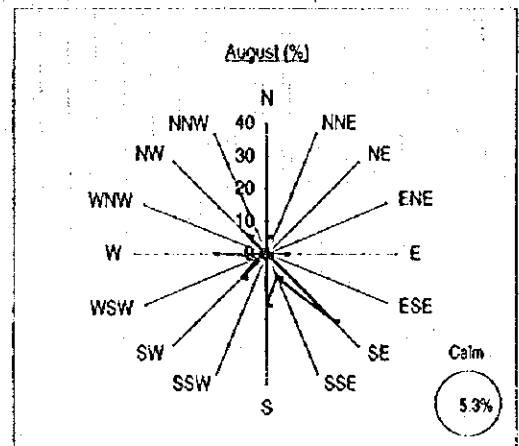
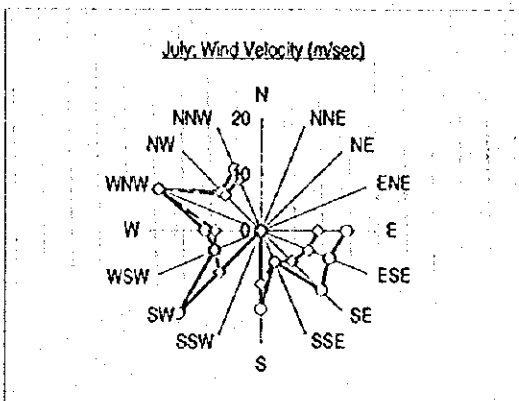
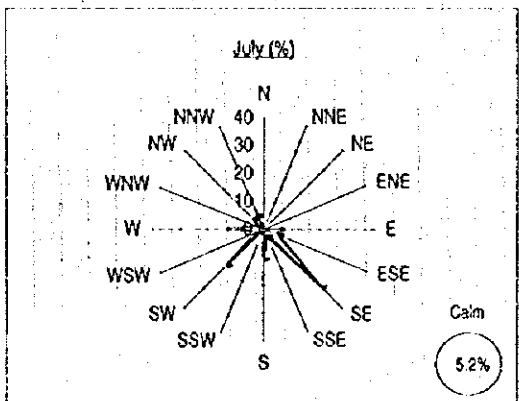
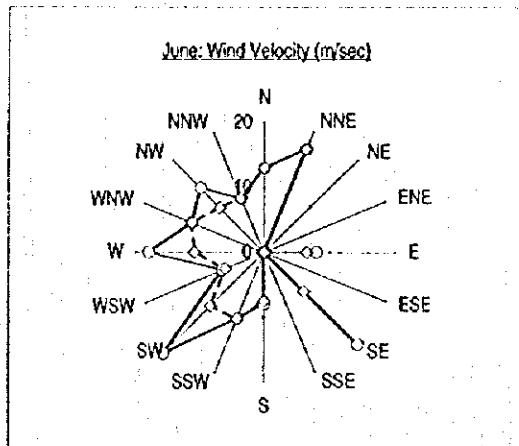
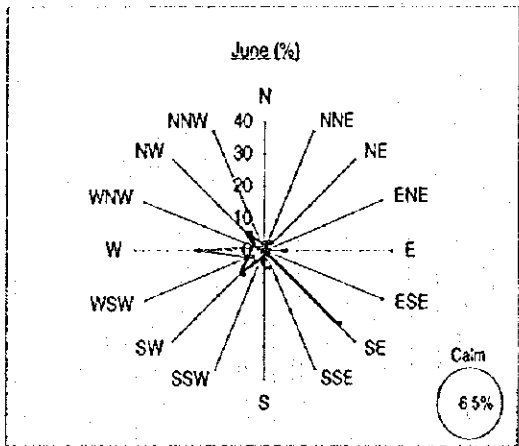
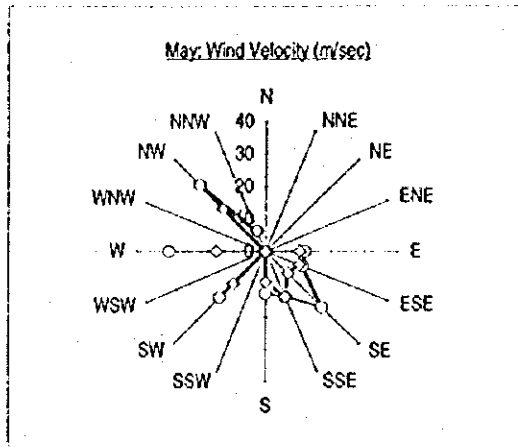
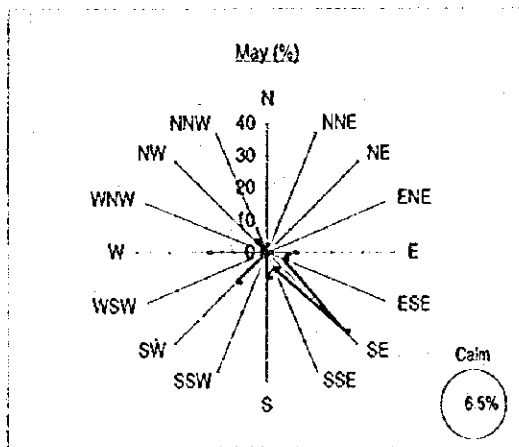


FIGURE A.3-13 WIND-ROSE: FREQUENCY AND MAXIMUM WIND VELOCITY (2/3)

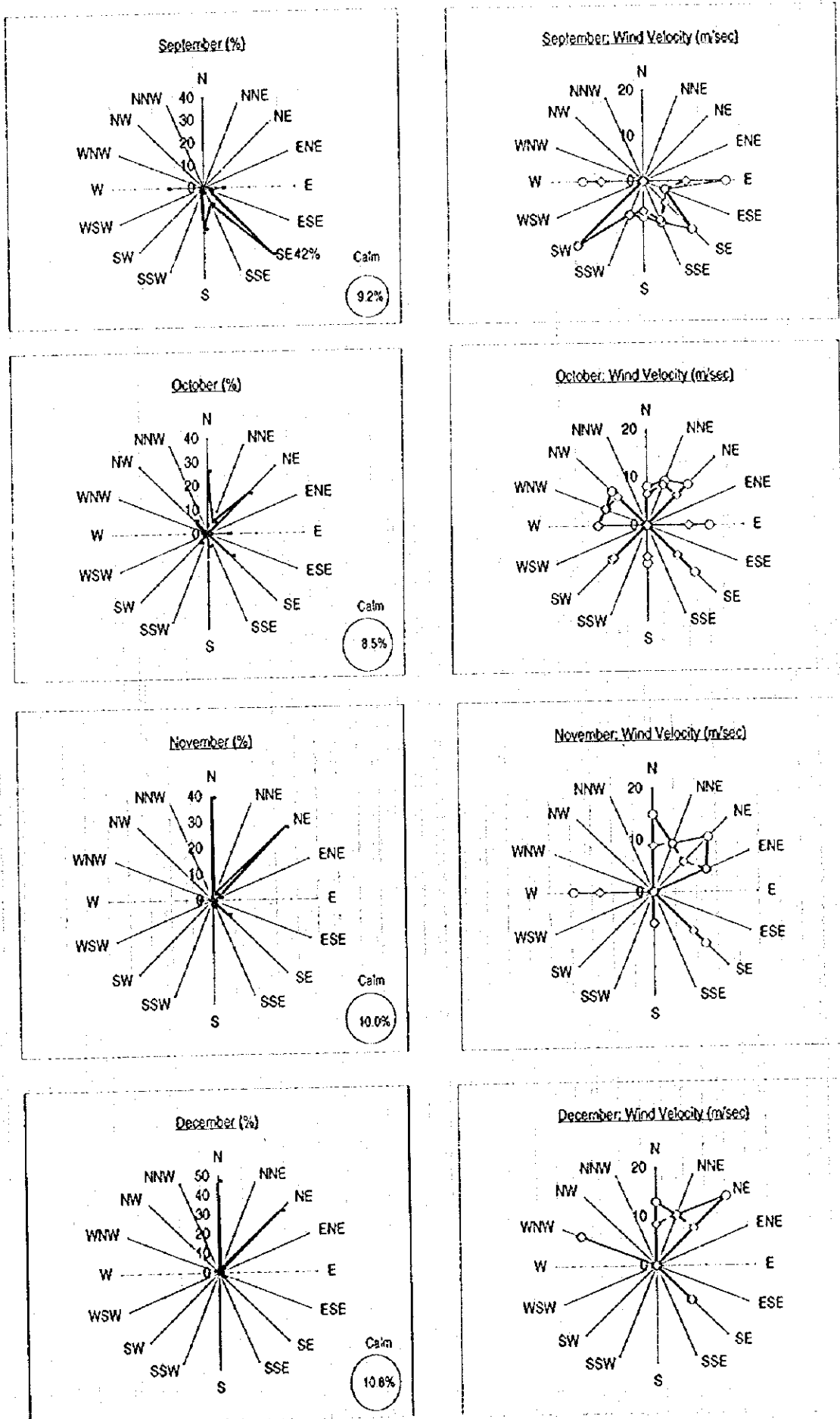


FIGURE A.3-13 WIND-ROSE: FREQUENCY AND MAXIMUM WIND VELOCITY (3/3)

TABLE A.3-14 FREQUENCY OF TROPICAL CYCLONES (1955-1994)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 1951 | | 1 | 1 | 2 | 1 | 1 | 3 | 3 | 2 | 4 | 1 | 2 | 21 |
| 1952 | | | | | | 3 | 3 | 5 | 3 | 6 | 3 | 4 | 27 |
| 1953 | | 1 | | | 1 | 2 | 1 | 6 | 3 | 5 | 3 | 1 | 23 |
| 1954 | | | 1 | | 1 | | 1 | 5 | 5 | 4 | 3 | 1 | 21 |
| 1955 | 1 | 1 | 1 | 1 | | 2 | 7 | 6 | 4 | 3 | 1 | 1 | 28 |
| 1956 | | | 1 | 2 | | 1 | 2 | 5 | 6 | 1 | 4 | 1 | 23 |
| 1957 | 2 | | | 1 | 1 | 1 | 1 | 4 | 5 | 4 | 3 | | 22 |
| 1958 | 1 | | | 1 | 1 | 4 | 7 | 5 | 5 | 3 | 2 | 2 | 31 |
| 1959 | | 1 | 1 | 1 | | | 2 | 5 | 5 | 4 | 2 | 2 | 23 |
| 1960 | | | | 1 | 1 | 3 | 3 | 10 | 3 | 4 | 1 | 1 | 27 |
| 1961 | 1 | | 1 | | 2 | 3 | 4 | 6 | 6 | 4 | 1 | 1 | 29 |
| 1962 | | 1 | | 1 | 2 | | 5 | 8 | 4 | 5 | 3 | 1 | 30 |
| 1963 | | | | 1 | | 4 | 4 | 3 | 5 | 4 | | 3 | 24 |
| 1964 | | | | | 2 | 2 | 7 | 5 | 6 | 5 | 6 | 1 | 34 |
| 1965 | 2 | 1 | 1 | 1 | 2 | 3 | 5 | 6 | 7 | 2 | 2 | | 32 |
| 1966 | | | | 1 | 2 | 1 | 4 | 10 | 9 | 5 | 2 | 1 | 35 |
| 1967 | | 1 | 2 | 1 | 1 | 1 | 7 | 9 | 9 | 4 | 3 | 1 | 39 |
| 1968 | | | | 1 | 1 | 1 | 3 | 8 | 3 | 5 | 5 | | 27 |
| 1969 | 1 | | 1 | 1 | | | 3 | 4 | 3 | 3 | 2 | 1 | 19 |
| 1970 | | 1 | | | | 2 | 3 | 6 | 5 | 5 | 4 | | 26 |
| 1971 | 1 | | 1 | 3 | 4 | 2 | 8 | 5 | 6 | 4 | 2 | | 36 |
| 1972 | 1 | | | | 1 | 3 | 7 | 5 | 4 | 5 | 3 | 2 | 31 |
| 1973 | | | | | | | 7 | 5 | 2 | 4 | 3 | | 21 |
| 1974 | 1 | | 1 | 1 | 1 | 4 | 4 | 5 | 5 | 4 | 4 | 2 | 32 |
| 1975 | 1 | | | | | | 2 | 4 | 5 | 5 | 3 | 1 | 21 |
| 1976 | 1 | 1 | | 2 | 2 | 2 | 4 | 4 | 5 | 1 | 1 | 2 | 25 |
| 1977 | | | 1 | | | 1 | 3 | 3 | 5 | 5 | 1 | 2 | 21 |
| 1978 | 1 | | | 1 | | 3 | 4 | 8 | 5 | 4 | 4 | | 30 |
| 1979 | 1 | | 1 | 1 | 2 | | 4 | 2 | 6 | 3 | 2 | 2 | 24 |
| 1980 | | | | 1 | 4 | 1 | 4 | 2 | 6 | 4 | 1 | 1 | 24 |
| 1981 | | | 1 | 2 | | 3 | 4 | 8 | 4 | 2 | 3 | 2 | 29 |
| 1982 | | | 3 | | 1 | 3 | 3 | 5 | 5 | 3 | 1 | 1 | 25 |
| 1983 | | | | | | 1 | 3 | 5 | 2 | 5 | 5 | 2 | 23 |
| 1984 | | | | | | 2 | 5 | 5 | 4 | 7 | 3 | 1 | 27 |
| 1985 | 2 | | | | 1 | 3 | 1 | 8 | 5 | 4 | 1 | 2 | 27 |
| 1986 | | 1 | | 1 | 2 | 2 | 4 | 4 | 3 | 5 | 4 | 3 | 29 |
| 1987 | 1 | | | 1 | | 2 | 4 | 4 | 6 | 2 | 2 | 1 | 23 |
| 1988 | 1 | | | | 1 | 3 | 2 | 8 | 8 | 5 | 2 | 1 | 31 |
| 1989 | 1 | | | 1 | 2 | 2 | 7 | 5 | 6 | 4 | 3 | 1 | 32 |
| 1990 | 1 | | | 1 | 1 | 3 | 4 | 6 | 4 | 4 | 4 | 1 | 29 |
| 1991 | | | 2 | 1 | 1 | 1 | 4 | 5 | 6 | 3 | 6 | | 29 |
| 1992 | 1 | 1 | | | | 2 | 4 | 8 | 5 | 7 | 3 | | 31 |
| 1993 | | | 1 | | | 1 | 4 | 7 | 5 | 5 | 2 | 3 | 28 |
| 1994 | | | | 1 | 1 | 2 | 7 | 9 | 8 | 6 | | 2 | 36 |
| MEAN 1951-1994 | 1.2 | 1.0 | 1.2 | 1.2 | 1.6 | 2.2 | 4.0 | 5.7 | 5.0 | 4.1 | 2.7 | 1.6 | 27.4 |
| MAX | 2 | 1 | 3 | 3 | 4 | 4 | 8 | 10 | 9 | 7 | 6 | 4 | 39 |
| MIN | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 19 |

Note: Monthly and annual frequency of tropical cyclones which attained tropical storm intensity or higher in the western North Pacific

Source: Japan Meteorological Agency

TABLE A.3-15 TROPICAL CYCLONES PASSING NEAR PAKSE AREA (1951-1990)

| YEAR | MONTH | SERIAL No. | PASSING THROUGH LATITUDE 13N:17N | SERIAL No. | PASSING THROUGH LATITUDE 14N:16N |
|--------|-----------------|----------------|----------------------------------|------------|----------------------------------|
| 1951 | Oct-Dec | 19 | 1 | | |
| 1952 | Oct-Dec | 17,19,26,25 | 3 | 17,19,26 | 3 |
| 1953 | Sep | 14,14 | 1 | 14,14 | 1 |
| 1954 | Oct-Dec | 22 | 1 | | |
| 1956 | Jan-Jul | 2 | 0 | 2 | 0 |
| 1957 | Oct-Dec | 17 | 1 | 17 | 1 |
| 1959 | Nov-Dec | 22 | 0 | | |
| 1960 | Oct-Dec | 23 | 1 | | |
| 1961 | Jan-Dec | 5,21,25 | 1 | 21,25 | 1 |
| 1962 | Sep | 18 | 0 | 18 | 0 |
| 1964 | Sep-Dec | 21-23,26,28,30 | 3 | 26,28 | 0 |
| 1966 | Oct-Dec | 35,33 | 1 | | |
| 1967 | Oct-Dec | 36 | 1 | 36 | 0 |
| 1968 | Aug | 14 | 1 | 14 | 1 |
| 1969 | Jan-Aug | 4,10 | 1 | 4 | 0 |
| 1970 | Oct-Dec | 20,22,25 | 1 | 20,22,25 | 1 |
| 1971 | Jan-Jul,Oct-Dec | 4,12,34 | 3 | 4,34 | 2 |
| 1972 | Jan-Dec | 3,18,30 | 1 | 3,18,30 | 1 |
| 1973 | Oct-Dec | 16,17 | 1 | 16 | 1 |
| 1974 | Nov-Dec | 29,31,27 | 1 | 27 | 0 |
| 1975 | Oct-Dec | 18 | 0 | | |
| 1977 | Sep | 12,10 | 0 | 12 | 0 |
| 1978 | Jan-Jun, Sep | 5 | 0 | 5 | 0 |
| 1979 | Sep-Dec | 15,19 | 0 | 15 | 0 |
| 1981 | Oct-Dec | 23 | 1 | 23 | 1 |
| 1982 | Sep | 16 | 1 | 16 | 1 |
| 1983 | Oct-Dec | ?,? | 1 | ? | 0 |
| 1984 | Jan-Dec | 1,14,20,23,24 | 2 | 1,14,20,24 | 2 |
| 1985 | Sep | 19 | 1 | | |
| 1985 | Oct-Dec | 25,? | 1 | | |
| 1986 | Jan-Dec | 4,19,22,23 | 2 | 4,22,23 | 1 |
| 1987 | Oct-Dec | 21 | 1 | | |
| 1988 | Oct-Dec | 30,29,25 | 2 | 25,29 | 1 |
| 1989 | Jan-Sep | 4,10,23 | 2 | 4 | 1 |
| 1990 | Aug-Dec | 16,18,22,24,26 | 3 | 18,22,24 | 2 |
| TOTAL: | | | 40 | | 21 |

Source: JICA Study Team, based on the Japan Meteorological Agency reports

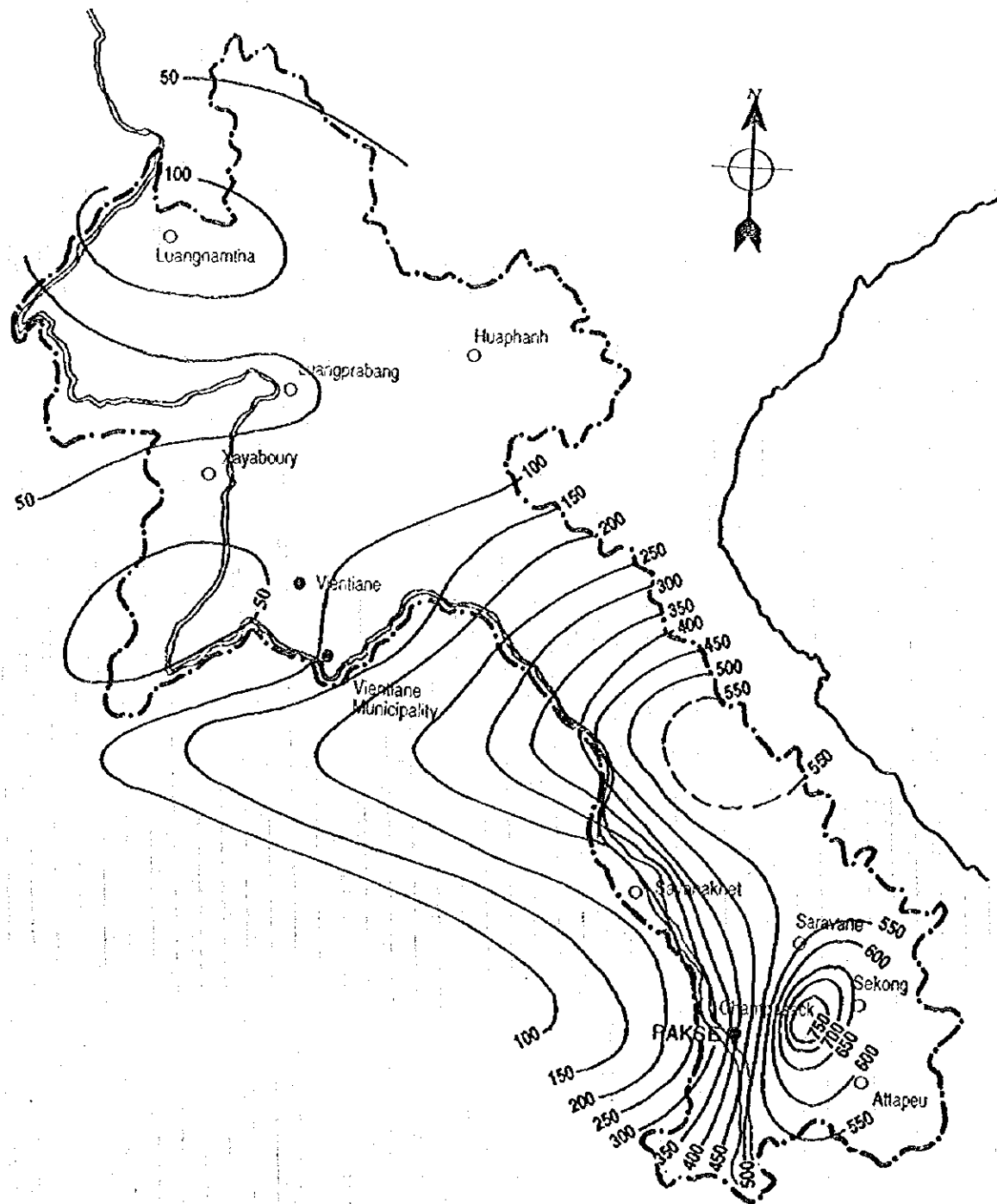


FIGURE A.3-14 ISOHYETS OF FIVE DAYS RAINFALL FROM TYPHOON "BESS" AT CHIAMPASAK AND SAVANAKHET PROVINCES (1978 AUG.)

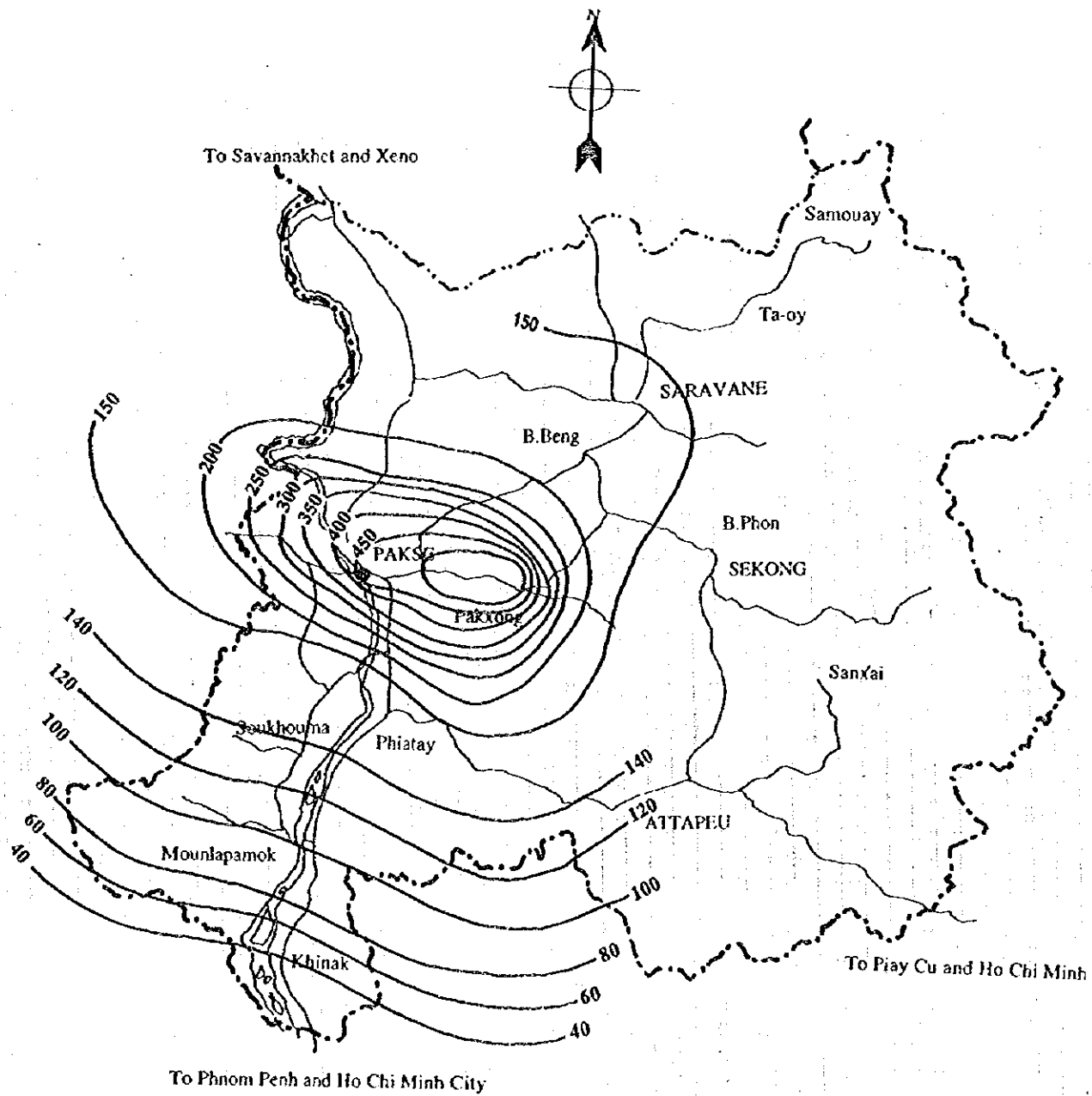


FIGURE A.3-15 ISOHYETS OF ONE DAY RAINFALL FROM TYPHOON "SARAH" AT CHAMPASAK PROVINCE (1983 JUNE)

TABLE A.3-16 MAXIMUM AND MINIMUM GAGE HEIGHT RECORDED AT PAKSE STATION

| YEAR | MAXIMUM | | MINIMUM | | YEAR | MAXIMUM | | MINIMUM | |
|------|------------|------|------------|------|--------------------|------------|------------|------------|------------|
| | HEIGHT (m) | DATE | HEIGHT (m) | DATE | | HEIGHT (m) | DATE | HEIGHT (m) | DATE |
| 1902 | 9.65 | | 1.00 | | 1951 | 12.47 | | 0.56 | |
| 1903 | 12.35 | | 0.35 | | 1952 | 11.75 | | 0.99 | |
| 1904 | 12.65 | | 0.35 | | 1953 | 10.98 | | 0.83 | |
| 1905 | 12.65 | | 0.35 | | 1954 | 11.69 | | 0.76 | |
| 1906 | 11.65 | | 0.65 | | 1955 | 9.55 | | 0.49 | |
| 1907 | 13.35 | | 0.80 | | 1956 | 12.52 | | 0.30 | |
| 1908 | 11.70 | | 0.80 | | 1957 | 11.03 | | 0.43 | |
| 1909 | 11.75 | | 0.35 | | 1958 | 11.88 | | 0.67 | |
| 1910 | 11.35 | | 0.50 | | 1959 | 10.75 | | 0.35 | |
| 1911 | 11.00 | | 0.35 | | 1960 | 13.01 | | 0.12 | |
| 1912 | 11.30 | | 0.35 | | 1961 | 13.35 | | 0.58 | |
| 1913 | 11.25 | | 0.35 | | 1962 | 10.81 | | | |
| 1914 | 13.22 | | 0.49 | | 1963 | 12.08 | | 0.38 | |
| 1915 | | | | | 1964 | 12.50 | | 0.93 | |
| 1916 | 9.20 | | 0.43 | | 1965 | 9.94 | | 0.67 | |
| 1917 | 10.44 | | 0.36 | | 1966 | 12.95 | | 0.70 | |
| 1918 | 12.34 | | 0.60 | | 1967 | 10.61 | | 0.55 | |
| 1919 | 11.65 | | 0.35 | | 1968 | 12.08 | | 0.51 | |
| 1920 | 11.65 | | 0.50 | | 1969 | 10.90 | 1969/08/15 | 0.40 | |
| 1921 | 10.30 | | 0.30 | | 1970 | 12.49 | 1970/09/04 | 0.37 | |
| 1922 | 11.26 | | 0.58 | | 1971 | 12.10 | 1971/07/18 | 0.50 | |
| 1923 | 13.35 | | 0.65 | | Max, Min (1902-71) | 13.35 | 1929// | 0.12 | 1960// |
| 1924 | 13.33 | | 0.70 | | Mean (1902-71) | 11.69 | | 0.55 | |
| 1925 | | | | | | | | | |
| 1926 | 11.47 | | 0.41 | | 1972 | 11.99 | 1972/08/09 | 0.67 | |
| 1927 | 11.43 | | 0.91 | | 1973 | 11.64 | 1973/09/07 | 0.58 | |
| 1928 | 9.86 | | 1.30 | | 1974 | 12.98 | 1974/08/20 | 0.63 | |
| 1929 | 13.61 | | 0.60 | | 1975 | 11.83 | 1975/08/31 | 0.57 | |
| 1930 | | | | | 1976 | 10.88 | 1976/08/07 | 0.74 | |
| 1931 | 9.84 | | 0.47 | | 1977 | 11.10 | 1977/09/12 | 0.66 | |
| 1932 | 10.27 | | 0.28 | | 1978(*) | 14.63 | 1978/08/17 | 0.55 | |
| 1933 | 11.75 | | 0.35 | | 1979 | 12.13 | 1979/08/13 | 0.65 | |
| 1934 | 12.00 | | 0.45 | | 1980 | 12.17 | 1980/09/21 | 0.56 | |
| 1935 | 10.32 | | 0.51 | | 1981 | 12.99 | 1981/08/12 | 0.78 | |
| 1936 | 11.28 | | 0.50 | | 1982 | 10.78 | 1982/09/09 | 0.76 | |
| 1937 | 13.07 | | 0.30 | | 1983 | 10.80 | 1983/09/01 | 0.72 | |
| 1938 | 11.20 | | 0.80 | | 1984 | 12.98 | 1984/08/18 | 0.47 | |
| 1939 | 13.35 | | 0.45 | | 1985 | 11.16 | 1985/09/05 | 0.66 | |
| 1940 | 12.40 | | 0.65 | | 1986 | 9.80 | 1986/09/11 | 0.60 | |
| 1941 | 11.85 | | 0.54 | | 1987 | 11.90 | 1987/08/23 | 0.59 | 1987/04/08 |
| 1942 | 12.53 | | 0.80 | | 1988 | 9.76 | 1988/08/17 | 0.56 | 1988/04/22 |
| 1943 | 12.53 | | 0.80 | | 1989 | 9.61 | 1989/08/05 | 0.41 | 1989/04/26 |
| 1944 | 10.96 | | 0.71 | | 1990 | 11.50 | 1990/08/06 | 0.54 | 1990/05/02 |
| 1945 | 11.20 | | 0.70 | | 1991 | 13.26 | 1991/09/06 | 0.61 | 1991/04/03 |
| 1946 | 12.30 | | 0.50 | | 1992 | 8.87 | 1992/08/19 | 0.61 | 1992/04/01 |
| 1947 | 11.60 | | 1.00 | | 1993 | 9.68 | 1993/07/18 | 0.45 | 1993/04/18 |
| 1948 | 13.30 | | 0.90 | | 1994 | 11.60 | 1994/09/06 | 0.69 | 1994/05/09 |
| 1949 | 12.00 | | 0.70 | | Max, Min (1972-94) | 14.63 | 1978/08/17 | 0.41 | 1989/04/26 |
| 1950 | 11.95 | | | | Mean (1972-94) | 11.48 | | 0.61 | |

Source: D.T.P.C., Subdivision of Water Communication, Pakse.

(*) Aug. 17, 1978's Gage Height was recorded as 14.63m (Pakse records), 14.71m (Vientiane records of Pakse flood data) and 14.48m (Ministry of Agriculture, Vientiane & Lower Mekong Hydrologic Yearbook). The High Water Level analysis was carried out basically using the data officially reported by the Ministry of Agriculture and Forestry at Vientiane. The gage height of 14.48 m, also officially reported by the Mekong Committee, is adopted as the highest gage height record.

TABLE A.3-17 RECORDS OF MEAN, MAXIMUM AND MINIMUM GAGE HEIGHT
AT PAKSE STATION, PERIOD FROM 1972 TO 1994

(Unit: Meters)

| YEAR | GAGE HEIGHT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|------|-------------|------|------|------|------|------|------|-------|-------|-------|-------|------|------|
| 1972 | Mean | 1.34 | 1.01 | 0.75 | 0.82 | 0.93 | 3.05 | 5.83 | 10.98 | 7.88 | 5.84 | 3.60 | 2.65 |
| | Max | 1.60 | 1.12 | 0.90 | 0.99 | 1.14 | 4.65 | 7.58 | 11.98 | 10.28 | 6.75 | 4.90 | 3.45 |
| | Min | 1.13 | 0.92 | 0.70 | 0.67 | 0.72 | 1.12 | 3.05 | 9.11 | 5.54 | 5.02 | 2.64 | 2.05 |
| 1973 | Mean | 1.48 | 0.99 | 0.77 | 0.65 | 1.27 | 3.08 | 6.16 | 8.04 | 10.49 | 6.17 | 3.30 | 2.17 |
| | Max | 2.10 | 1.15 | 1.15 | 0.73 | 1.58 | 4.37 | 8.04 | 10.18 | 11.66 | 8.76 | 4.14 | 3.14 |
| | Min | 1.17 | 0.79 | 0.64 | 0.58 | 0.80 | 1.66 | 3.10 | 6.09 | 8.90 | 4.04 | 2.62 | 1.65 |
| 1974 | Mean | 1.30 | 0.98 | 0.70 | 0.66 | 1.29 | 3.81 | 4.63 | 9.52 | 9.51 | 5.16 | 3.15 | 1.83 |
| | Max | 1.60 | 1.10 | 0.90 | 1.02 | 2.00 | 5.57 | 7.19 | 12.98 | 11.46 | 6.46 | 3.99 | 2.55 |
| | Min | 1.11 | 0.92 | 0.63 | 0.65 | 0.91 | 2.24 | 2.91 | 6.25 | 6.55 | 3.37 | 2.67 | 1.41 |
| 1975 | Mean | 1.32 | 0.98 | 0.67 | 0.62 | 1.12 | 4.31 | 6.42 | 9.45 | 10.23 | 6.80 | 3.91 | 1.83 |
| | Max | 1.48 | 1.34 | 0.80 | 0.77 | 1.80 | 6.95 | 7.93 | 11.83 | 11.81 | 8.18 | 5.54 | 2.45 |
| | Min | 1.22 | 0.75 | 0.59 | 0.57 | 0.69 | 1.82 | 4.84 | 6.80 | 8.34 | 5.70 | 2.55 | 1.53 |
| 1976 | Mean | 1.19 | 1.00 | 0.80 | 0.82 | 0.80 | 3.15 | 5.23 | 9.50 | 6.95 | 6.42 | 4.25 | 2.09 |
| | Max | 1.50 | 1.14 | 0.95 | 1.03 | 0.95 | 4.02 | 7.33 | 10.88 | 7.85 | 8.56 | 5.22 | 2.92 |
| | Min | 1.03 | 0.93 | 0.74 | 0.74 | 0.74 | 1.74 | 2.80 | 7.82 | 6.09 | 4.99 | 3.06 | 1.35 |
| 1977 | Mean | 1.15 | 0.77 | 0.79 | 0.91 | 1.03 | 1.43 | 4.33 | 6.64 | 8.47 | 4.81 | 2.99 | 1.66 |
| | Max | 1.28 | 0.88 | 0.85 | 1.13 | 1.34 | 2.50 | 6.86 | 7.66 | 11.10 | 7.23 | 3.98 | 2.04 |
| | Min | 0.90 | 0.69 | 0.66 | 0.68 | 0.82 | 1.12 | 2.40 | 5.76 | 6.45 | 3.28 | 2.06 | 1.37 |
| 1978 | Mean | 1.40 | 0.94 | 0.74 | 0.68 | 1.37 | 4.42 | 7.54 | 12.30 | 10.53 | 8.22 | 3.44 | 1.77 |
| | Max | 1.64 | 1.26 | 0.88 | 0.93 | 2.74 | 7.47 | 10.11 | 14.48 | 11.88 | 11.50 | 5.17 | 2.21 |
| | Min | 1.30 | 0.67 | 0.63 | 0.53 | 0.87 | 2.97 | 6.10 | 9.95 | 9.56 | 5.37 | 2.22 | 1.46 |
| 1979 | Mean | 1.29 | 1.01 | 0.79 | 0.77 | 1.81 | 4.59 | 6.69 | 8.73 | 8.46 | 5.51 | 2.40 | 1.55 |
| | Max | 1.46 | 1.11 | 0.91 | 0.94 | 3.03 | 9.55 | 8.94 | 12.13 | 10.66 | 8.70 | 3.30 | 1.84 |
| | Min | 1.12 | 0.95 | 0.65 | 0.68 | 0.94 | 2.58 | 4.33 | 4.00 | 7.54 | 3.40 | 1.85 | 1.30 |
| 1980 | Mean | 1.06 | 0.77 | 0.65 | 0.65 | 1.14 | 3.30 | 6.25 | 8.40 | 10.99 | 6.91 | 4.01 | 2.00 |
| | Max | 1.29 | 0.85 | 0.74 | 0.72 | 1.90 | 6.32 | 9.56 | 10.04 | 12.17 | 9.10 | 5.39 | 2.66 |
| | Min | 0.87 | 0.70 | 0.59 | 0.56 | 0.71 | 2.00 | 4.50 | 6.76 | 9.41 | 5.40 | 2.72 | 1.62 |
| 1981 | Mean | 1.34 | 1.03 | 0.88 | 0.87 | 1.70 | 6.67 | 9.36 | 10.52 | 8.44 | 6.15 | 3.73 | 2.45 |
| | Max | 1.58 | 1.14 | 0.99 | 1.02 | 4.06 | 9.36 | 10.52 | 12.99 | 9.64 | 7.75 | 4.62 | 3.30 |
| | Min | 1.15 | 0.96 | 0.82 | 0.73 | 0.99 | 3.94 | 6.74 | 8.66 | 5.48 | 4.42 | 3.10 | 1.94 |
| 1982 | Mean | 1.60 | 1.21 | 0.91 | 0.97 | 1.15 | 2.67 | 5.05 | 8.28 | 9.11 | 7.73 | 3.51 | 1.97 |
| | Max | 1.93 | 1.38 | 1.06 | 1.26 | 1.29 | 4.62 | 6.32 | 10.45 | 10.78 | 10.36 | 4.94 | 2.58 |
| | Min | 1.39 | 1.06 | 0.78 | 0.76 | 0.96 | 1.16 | 3.94 | 5.02 | 7.84 | 5.26 | 2.70 | 1.52 |
| 1983 | Mean | 1.34 | 0.98 | 0.92 | 0.84 | 1.02 | 2.37 | 4.05 | 7.43 | 8.52 | 6.65 | 4.60 | 2.46 |
| | Max | 1.51 | 1.14 | 0.98 | 0.97 | 1.14 | 5.64 | 5.90 | 10.39 | 10.30 | 8.10 | 5.75 | 3.88 |
| | Min | 1.14 | 0.87 | 0.82 | 0.72 | 0.72 | 1.22 | 2.64 | 5.64 | 7.35 | 4.88 | 3.69 | 1.74 |
| 1984 | Mean | 1.57 | 1.05 | 0.73 | 0.60 | 1.46 | 3.50 | 7.37 | 10.41 | 9.14 | 5.90 | 3.52 | 1.84 |
| | Max | 2.00 | 1.20 | 0.90 | 0.90 | 2.63 | 5.65 | 8.86 | 12.98 | 12.10 | 7.04 | 5.12 | 2.30 |
| | Min | 1.22 | 0.92 | 0.57 | 0.70 | 1.04 | 2.28 | 5.74 | 7.72 | 6.20 | 5.20 | 2.35 | 1.48 |
| 1985 | Mean | 1.28 | 0.94 | 0.80 | 0.72 | 1.24 | 4.77 | 6.40 | 9.67 | 9.42 | 5.60 | 3.69 | 2.55 |
| | Max | 1.47 | 1.09 | 0.95 | 0.98 | 1.48 | 8.77 | 7.52 | 10.47 | 11.16 | 7.16 | 4.58 | 4.04 |
| | Min | 1.10 | 0.82 | 0.66 | 0.66 | 1.00 | 1.42 | 5.42 | 7.58 | 7.38 | 4.46 | 2.94 | 1.77 |
| 1986 | Mean | 1.45 | 1.06 | 0.80 | 0.67 | 2.22 | 5.01 | 6.34 | 8.53 | 7.88 | 4.87 | 3.18 | 1.84 |
| | Max | 1.75 | 1.20 | 0.92 | 0.79 | 4.58 | 6.64 | 9.80 | 9.70 | 9.79 | 6.02 | 4.60 | 2.36 |
| | Min | 1.20 | 0.93 | 0.70 | 0.60 | 0.80 | 3.78 | 4.10 | 6.76 | 5.59 | 3.67 | 2.40 | 1.30 |
| 1987 | Mean | 1.16 | 0.92 | 0.74 | 0.63 | 0.78 | 2.08 | 4.68 | 7.53 | 8.28 | 5.56 | 2.95 | 1.87 |
| | Max | 1.40 | 1.02 | 0.84 | 0.70 | 0.92 | 3.90 | 5.59 | 11.90 | 10.12 | 7.32 | 3.50 | 2.82 |
| | Min | 0.98 | 0.81 | 0.60 | 0.59 | 0.65 | 0.75 | 2.92 | 4.46 | 7.00 | 3.60 | 2.66 | 1.44 |
| 1988 | Mean | 1.16 | 0.85 | 0.69 | 0.64 | 1.61 | 3.49 | 4.24 | 8.22 | 6.43 | 5.09 | 2.74 | 1.53 |
| | Max | 1.43 | 1.00 | 0.80 | 0.88 | 2.58 | 4.30 | 5.42 | 9.76 | 7.94 | 6.66 | 4.41 | 1.92 |
| | Min | 1.00 | 0.74 | 0.58 | 0.56 | 0.87 | 2.59 | 2.85 | 4.96 | 4.48 | 3.64 | 1.89 | 1.14 |

(Continue)

| YEAR | GAGE HEIGHT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|--------------|-------------|------|------|------|------|------|------|-------|-------|-------|-------|------|------|
| 1989 | Mean | 0.91 | 0.65 | 0.49 | 0.50 | 1.15 | 3.76 | 4.95 | 8.18 | 7.14 | 6.25 | 3.38 | 1.72 |
| | Max | 1.11 | 0.73 | 0.53 | 0.58 | 3.01 | 5.98 | 8.06 | 9.61 | 8.33 | 7.68 | 5.32 | 2.11 |
| | Min | 0.73 | 0.54 | 0.45 | 0.42 | 0.48 | 2.40 | 3.12 | 7.24 | 6.28 | 5.48 | 2.22 | 1.36 |
| 1990 | Mean | 1.17 | 0.87 | 0.90 | 0.67 | 1.16 | 5.71 | 7.72 | 8.84 | 9.04 | 6.63 | 3.77 | 1.99 |
| | Max | 1.37 | 0.94 | 1.01 | 0.81 | 2.66 | 7.54 | 9.64 | 11.43 | 10.52 | 7.81 | 4.76 | 2.72 |
| | Min | 0.95 | 0.83 | 0.84 | 0.58 | 0.54 | 2.68 | 6.66 | 6.51 | 7.78 | 4.83 | 2.60 | 1.50 |
| 1991 | Mean | 1.24 | 0.90 | 0.74 | 0.79 | 1.00 | 2.59 | 6.43 | 9.94 | 9.39 | 6.37 | 3.77 | 1.90 |
| | Max | 1.47 | 1.03 | 0.79 | 1.08 | 1.32 | 5.77 | 8.96 | 12.66 | 13.25 | 7.82 | 4.91 | 2.44 |
| | Min | 1.04 | 0.78 | 0.68 | 0.64 | 0.73 | 1.19 | 4.59 | 7.09 | 7.52 | 5.02 | 2.45 | 1.45 |
| 1992 | Mean | 1.33 | 1.01 | 0.83 | 0.74 | 0.88 | 2.41 | 4.86 | 7.41 | 6.68 | 4.39 | 2.67 | 1.44 |
| | Max | 1.56 | 1.13 | 1.06 | 0.98 | 1.05 | 4.67 | 7.78 | 8.76 | 7.87 | 5.87 | 3.87 | 1.91 |
| | Min | 1.10 | 0.82 | 0.61 | 0.61 | 0.77 | 1.04 | 2.78 | 6.35 | 5.77 | 2.92 | 1.69 | 1.14 |
| 1993 | Mean | 1.05 | 0.73 | 0.64 | 0.56 | 1.09 | 2.62 | 6.75 | 7.90 | 7.94 | 4.21 | 2.61 | 1.46 |
| | Max | 1.38 | 0.80 | 0.74 | 0.76 | 2.43 | 3.67 | 9.66 | 9.08 | 9.03 | 5.73 | 3.28 | 1.80 |
| | Min | 0.81 | 0.66 | 0.55 | 0.45 | 0.66 | 1.55 | 3.66 | 6.15 | 5.92 | 3.15 | 1.85 | 1.23 |
| 1994 | Mean | 1.02 | 0.89 | 0.66 | 0.87 | 1.10 | 5.22 | 8.49 | 10.24 | 9.90 | 5.97 | 2.52 | 1.89 |
| | Max | 1.22 | 0.98 | 0.76 | 1.09 | 1.92 | 7.58 | 10.48 | 11.41 | 11.60 | 8.06 | 3.90 | 2.06 |
| | Min | 0.89 | 0.64 | 0.63 | 0.71 | 0.69 | 1.91 | 6.59 | 9.45 | 8.35 | 3.63 | 1.95 | 1.55 |
| 1972 to 1994 | Mean | 1.27 | 0.94 | 0.76 | 0.73 | 1.23 | 3.65 | 6.08 | 8.98 | 8.73 | 5.97 | 3.38 | 1.93 |
| | Max | 2.10 | 1.38 | 1.15 | 1.26 | 4.58 | 9.55 | 10.52 | 14.48 | 13.25 | 11.50 | 5.75 | 4.04 |
| | Min | 0.73 | 0.54 | 0.45 | 0.42 | 0.48 | 0.75 | 2.40 | 4.00 | 4.48 | 2.92 | 1.69 | 1.14 |

Source: Ministry of Agriculture and Forestry, Vientiane

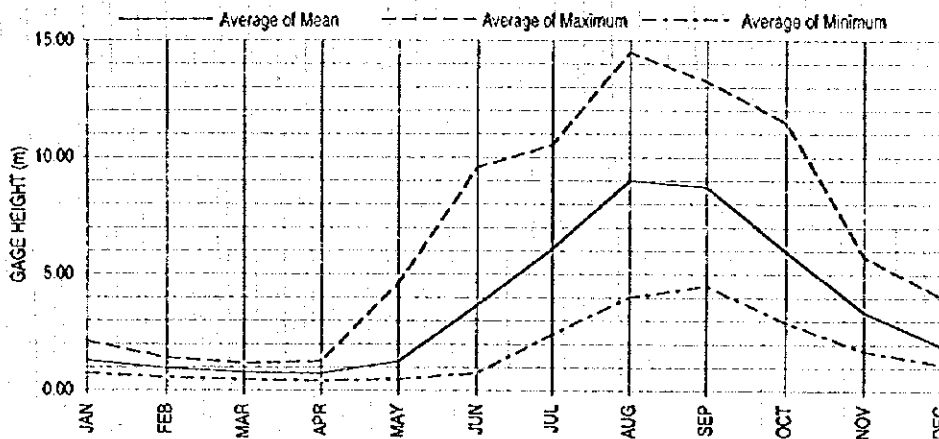


FIGURE A.3-16 GAGE HEIGHT AT PAKSE SATION (1972-1994)

TABLE A.3-18 ANNUAL MEAN OF GAGE HEIGHT, DISCHARGE AND TOTAL RUN-OFF, PAKSE STATION (1972-1994)

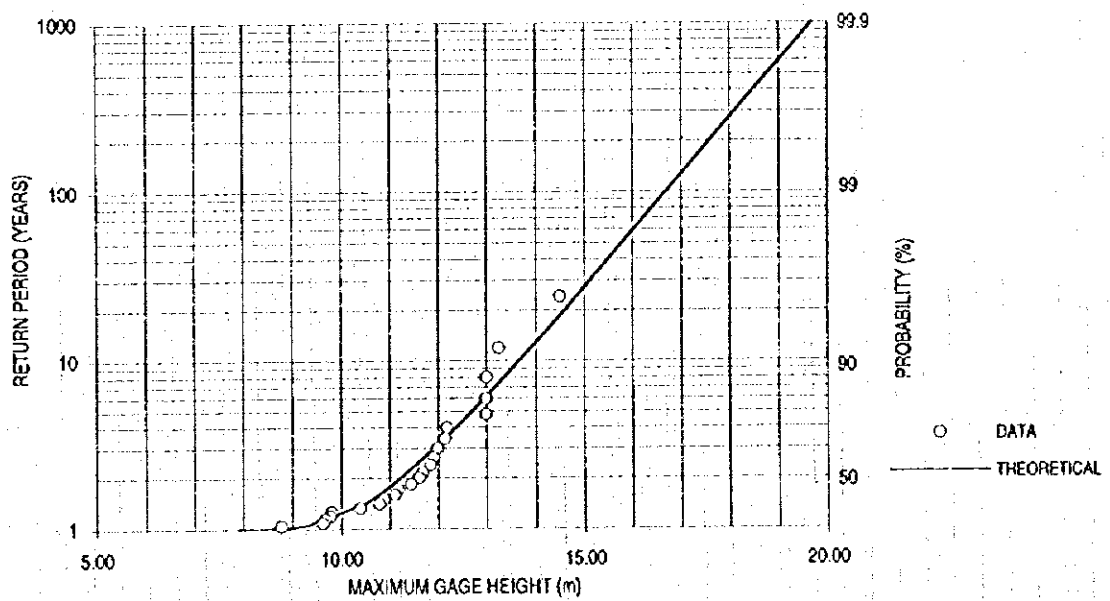
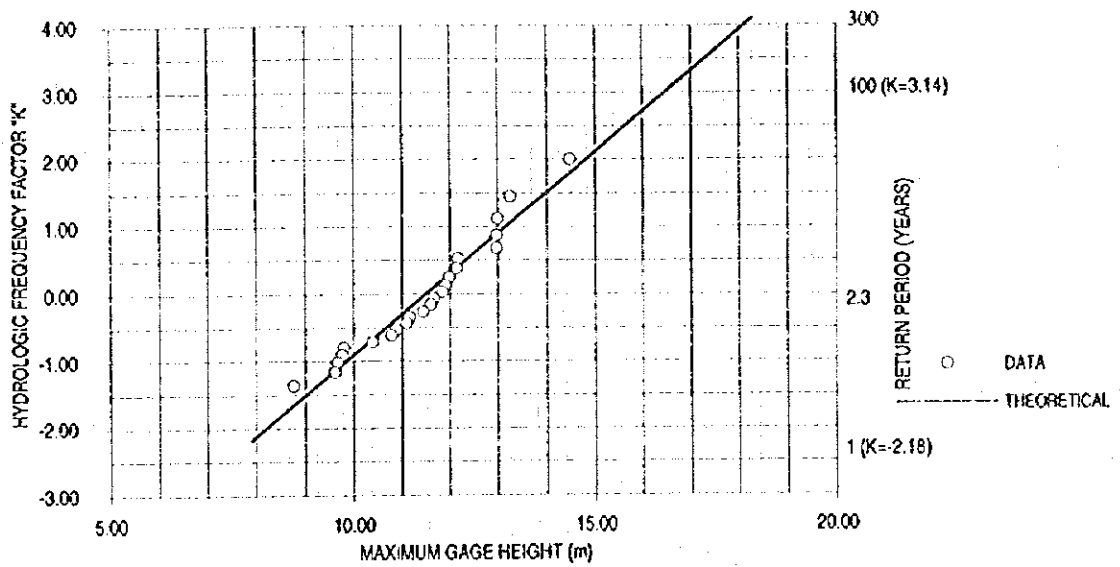
| YEAR | MEAN GAGE HEIGHT (m) | MEAN DISCHARGE (m3/sec) | TOTAL RUN OFF (million m3) |
|------|-------------------------|----------------------------|-------------------------------|
| 1972 | 3.72 | 9,720 | 307,000 |
| 1973 | 3.71 | 9,830 | 310,000 |
| 1974 | 3.56 | 9,490 | 299,000 |
| 1975 | 3.97 | 10,700 | 337,000 |
| 1976 | 3.52 | 9,160 | 290,000 |
| 1977 | 2.92 | 7,340 | 231,000 |
| 1978 | 4.45 | 12,800 | 402,000 |
| 1979 | 3.63 | 9,500 | 300,000 |
| 1980 | 3.84 | 10,400 | 328,000 |
| 1981 | 4.43 | 12,100 | 381,000 |
| 1982 | 3.68 | 9,610 | 303,000 |
| 1983 | 3.43 | 8,720 | 275,000 |
| 1984 | 3.92 | 10,600 | 334,000 |
| 1985 | 3.93 | 10,100 | 319,000 |
| 1986 | 3.65 | 9,020 | 284,000 |
| 1987 | 3.10 | 7,740 | 244,000 |
| 1988 | 3.06 | 7,390 | 234,000 |
| 1989 | 3.26 | 8,390 | 264,000 |
| 1990 | 4.04 | 10,300 | 326,000 |
| 1991 | 3.76 | 9,980 | 315,000 |
| 1992 | 2.89 | 3,007 | |
| 1993 | 3.13 | | |
| 1994 | 4.06 | | |
| MEAN | 3.64 | 9,328 | 304,150 |
| MAX | 4.45 | 12,800 | 402,000 |
| MIN | 2.89 | 3,007 | 231,000 |

Source: Ministry of Agriculture and Forestry, Vientiane.

TABLE A.3-19 GAGE HEIGHT DATA FOR WATER LEVEL ANALYSIS

| YEAR | Height (m) | | Discharge (m ³ /sec) | |
|------|------------|------|---------------------------------|-------|
| | Max | Min | Max | Min |
| 1972 | 11.98 | 0.67 | 39,600 | 1,740 |
| 1973 | 11.66 | 0.58 | 38,000 | 1,630 |
| 1974 | 12.98 | 0.63 | 44,900 | 1,710 |
| 1975 | 11.83 | 0.57 | 38,800 | 1,610 |
| 1976 | 10.88 | 0.74 | 34,000 | 1,900 |
| 1977 | 11.10 | 0.66 | 35,100 | 1,760 |
| 1978 | 14.48 | 0.53 | 56,000 | 1,550 |
| 1979 | 12.13 | 0.65 | 40,200 | 1,740 |
| 1980 | 12.17 | 0.56 | 40,600 | 1,600 |
| 1981 | 12.99 | 0.78 | 45,500 | 1,970 |
| 1982 | 10.78 | 0.76 | 33,500 | 1,930 |
| 1983 | 10.39 | 0.72 | 31,600 | 1,860 |
| 1984 | 12.98 | 0.57 | 45,500 | 1,460 |
| 1985 | 11.16 | 0.66 | 34,000 | 1,730 |
| 1986 | 09.80 | 0.60 | 28,300 | 1,650 |
| 1987 | 11.90 | 0.59 | 37,900 | 1,630 |
| 1988 | 09.76 | 0.56 | 28,800 | 1,490 |
| 1989 | 09.61 | 0.42 | 28,700 | 1,380 |
| 1990 | 11.43 | 0.54 | 34,100 | |
| 1991 | 13.25 | 0.64 | 42,000 | 1,580 |
| 1992 | 08.76 | 0.61 | 3,350 | 1,530 |
| 1993 | 09.66 | 0.45 | | |
| 1994 | 11.60 | 0.63 | | |

Source: Ministry of Agriculture & Forestry, Vientiane.



● 1902-71 — Gumbel ○ 1972-94

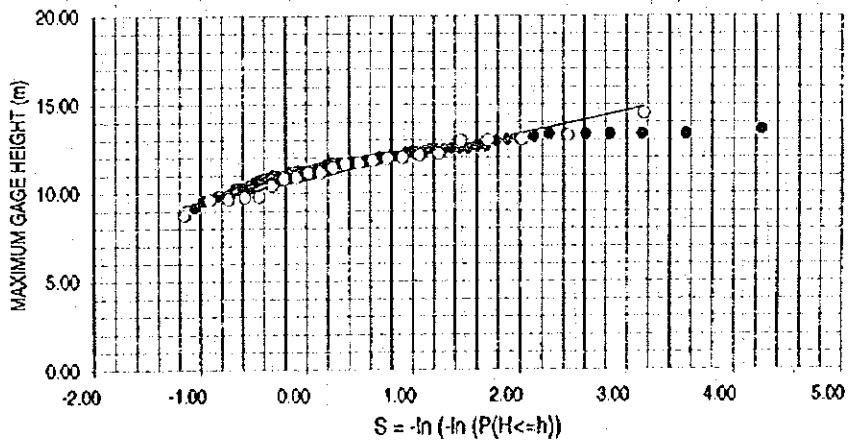


FIGURE A.3-17 PROBABILITY DISTRIBUTION FOR HIGH WATER LEVEL ANALYSIS

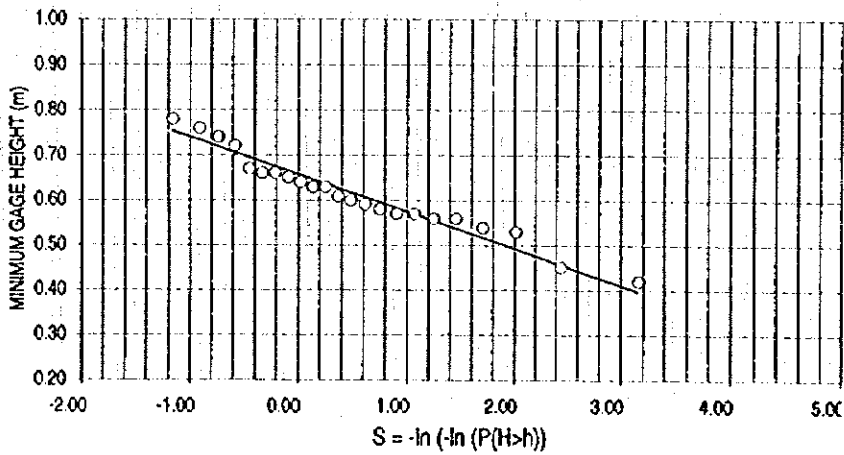
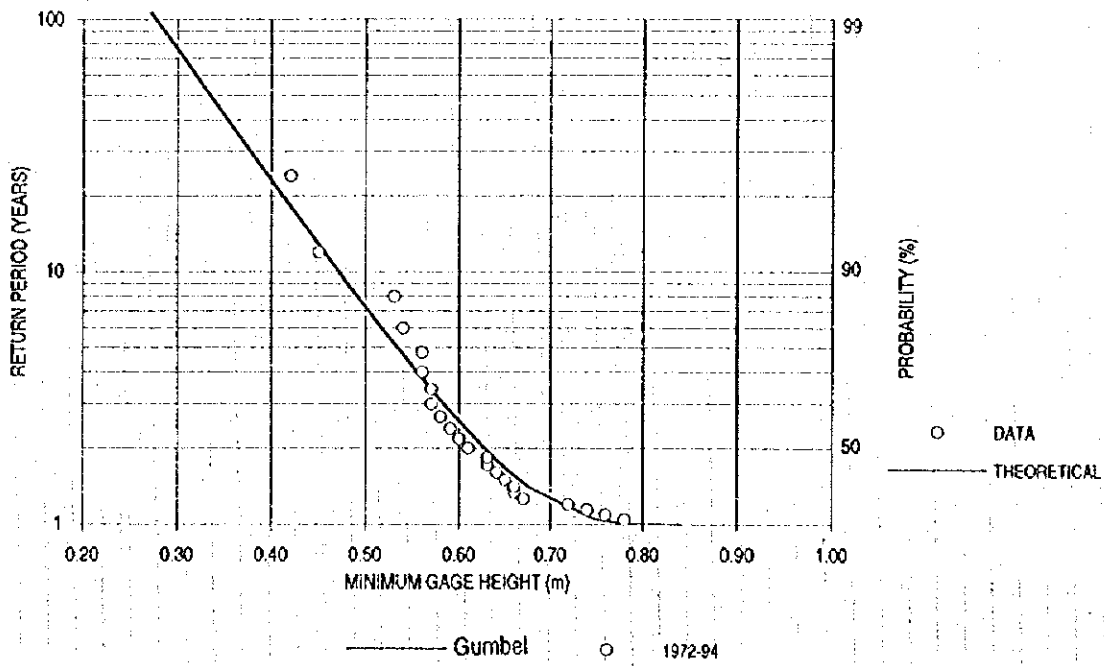
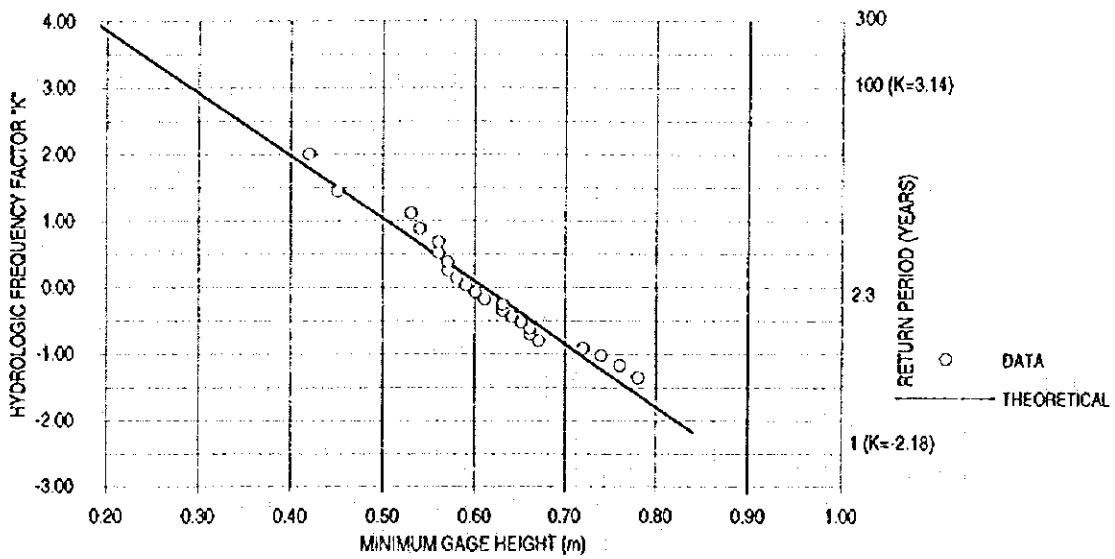


FIGURE A.3-18 PROBABILITY DISTRIBUTION FOR LOW WATER LEVEL ANALYSIS

TABLE A.3- 20 RATING EQUATIONS FOR DISCHARGE CALCULATION

MEKONG AT PAKSE: $Q = a * (H + c) ^ b$

| Rating | | Parameters a, c & b | | | Max. Stage |
|--------|------------|---------------------|-------|-------|------------|
| Letter | Date | a | c | b | (m) |
| A | 1-Jan-1923 | 723.056 | 1.160 | 1.534 | 9.74 |
| | | 530.954 | 1.160 | 1.664 | 15.00 |
| B | 1-Jan-1960 | 845.180 | 1.020 | 1.475 | 8.67 |
| | | 629.214 | 1.020 | 1.605 | 15.00 |
| C | 1-Jan-1967 | 855.797 | 0.990 | 1.475 | 9.68 |
| | | 629.214 | 0.990 | 1.605 | 15.00 |
| D | 1-Jan-1974 | 723.056 | 1.160 | 1.534 | 9.74 |
| | | 530.954 | 1.160 | 1.664 | 15.00 |
| E | 1-Jan-1986 | 778.551 | 0.960 | 1.509 | 8.00 |
| | | 629.214 | 0.960 | 1.605 | 15.00 |

Source: Water Balance Study, Phase 3 Report, 1991

TABLE A.3- 21 GAGE HEIGHT RECORDS OF FLOOD

| YEAR | GAUGE HEIGHT (m) | ELEVATION (m msl) | REMARKS |
|---------|------------------|-------------------|---------------------|
| 1929 | 13.61 | 100.10 | |
| 1937 | 13.09 | 99.58 | |
| 1939 | 13.35 | 99.84 | |
| 1951 | 12.47 | 98.96 | |
| 1956 | 12.52 | 99.01 | |
| 1960 | 13.01 | 99.50 | |
| 1961 | 13.35 | 99.84 | |
| 1963 | 12.08 | 98.57 | |
| 1964 | 12.50 | 98.99 | |
| 1966 | 12.95 | 99.44 | |
| 1970 | 12.38 | 98.87 | |
| 1974 | 12.98 | 99.47 | |
| 1978(*) | 14.71 | 101.20 | August 17, 14:00 hr |
| 1979 | 12.20 | 98.69 | |
| 1981 | 12.71 | 99.20 | |
| 1984 | 12.98 | 99.47 | |
| 1991 | 12.66 | 99.15 | |
| 1995 | 12.39 | 98.88 | September 6 |

Source: Ministry of Agriculture and Forestry, Vientiane

(*) Aug. 17, 1978's Gage Height was also recorded as 14.63m (Pakse records) , and 14.48m (Ministry of Agriculture, Vientiane & Lower Mekong Hydrologic Yearbook). The gage height of 14.48 m is adopted as the highest gage height record.