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WORLD FLOOD STUDY			
INTERIM REPORT			
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World Flood Study

Interim Report

January 1984

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WORLD FLOOD STUDY - INTERIM REPORT

Introduction

This report summarizes the data collected and work carried out for the World Flood Study project.

The work undertaken so far has involved entry of data onto a purpose built micro-computer based archive system and subsequent processing by statistical analysis programs to derive individual flood frequency curves for each station. Combined, non-dimensional, flood frequency curves (growth curves) were then produced for each country or region. Data from all stations have been analysed in a consistent manner which allows direct comparison of results station by station or country by country. To date data from 558 stations in 33 countries, comprising some 14529 station years has entered the system (Table 1).

The primary source of information has been the world catalogue of very large floods published by UNESCO (1976). The remainder of the data has come from within the Institute of Hydrology and has been collected over the years by various projects either for regional flood studies or as part of water resource studies. Although it might be argued that the investigation should be geared to the needs of developing countries, the inclusion of records from a wide variety of climates is a necessary preliminary to the understanding required for this study.

The large amount of data has meant that no check has been made by us on the quality of individual records. Apart from obvious mistakes, therefore, the data has been accepted as given.

At this stage of the project it would be unwise to use the results presented here as the basis of design. Investigations into the techniques of analysis are suggested in Section 5 which may substantially alter the regional growth curves. The results are presented here to provide the basis for future work and as a record of the work undertaken to date.

LIST OF COUNTRIES

CODE	COUNTRY	DATA SOURCE	NO.STATIONS	NO.STATION YEARS
BAN	BANGLADESH	UNESCO	3	15
BOT	BOTSWANA	IH	4	38
BRA	BRAZIL	IH	56	1166
BUL	BULGARIA	UNESCO	5	272
BOT	BOTSWANA	IH	4	38
CAN	CANADA	UNESCO	15	458
CON	CONGO	UNESCO	6	38
CZE	CZECHOSLOVAKIA	UNESCO	16	766
GHA	GHANA	UNESCO	7	161
GUI	GUINEA	IH	17	271
GUY	GUYANA	UNESCO	8	203
HUN	HUNGARY	UNESCO	9	165
IND	INDIA	UNESCO/IH	13	231
IRA	IRAN	IH	25	343
ITA	ITALY	UNESCO	22	700
IVO	IVORY COAST	UNESCO	10	193
JAP	JAPAN	UNESCO	15	409
JAV	JAVA	IH	47	607
JOR	JORDAN	UNESCO	6	57
KOR	KOREA	IH	23	508
MAL	MALAYSIA	UNESCO	4	64
MAW	MALAWI	IH	28	509
MOR	MOROCCO	UNESCO	3	93
NIG	NIGERIA	IH	7	93
POL	POLAND	UNESCO	11	364
ROM	ROMANIA	UNESCO	14	420
SUD	SUDAN	IH	4	215
	(BLUE NILE)			
SUM	SUMATRA	IH	49	409
SRI	SRI-LANKA	UNESCO/IH	13	280
SWE	SWEDEN	UNESCO	20	1127
TOG	TOGO & BENIN	IH	19	433
UNI	UNITED KINGDOM	UNESCO	9	427
USA	USA	UNESCO	32	1823
USS	USSR	UNESCO	38	1671
TOTAL	33 COUNTRIES		558	14529

Even when the method of analysis has been finalised the potential user should make sure that:

- (1) The site for which the flood estimate is required is close to those used in the derivation of the regional curve.
- (2) The catchment characteristics of the site, such as catchment area, rainfall and slope are similar to those used in the regional analysis.
- (3) There are sufficient station years in the regional group to allow estimation of the required return period flood.

For several countries there are, at present, only a few stations on the data base and these may lie in one particular region be of a particular type of catchment which may be very different hydrologically to the site of interest. Take, for example, the Sudan which has just four stations. These are all on the Nile or its major tributaries and have catchment areas of between 35,000 km² and 210,000 km². It would be quite wrong (and dangerous) to apply the regional growth curve obtained here to a small 100 km² catchment elsewhere in the country.

The following chapters describe how the data have been processed and present a summary of data collected to date. The appendices of this report outline the computer system developed for this project and give a more comprehensive listing of data from each region.

It is intended that the archive should grow as more annual maximum flood series become available and this report be updated from time to time when the increase in data warrants it or further analysis on the data is completed.

2. Processing method

The data analysis procedure was the same for all countries and all stations within each country. Data were first entered into the system as an annual maximum series of flood peaks together with their year of occurrence. These data were then processed to produce an individual non dimensional. flood frequency curve (growth curve) for that station. Growth curves from all stations within a region were then combined to produce an overall pooled growth curve for the region. The techniques used were those developed for the UK Flood Studies report (NERC, 1975), and were as follows:

- (1) The annual maximum floods were abstracted from the N years of data and ordered so that the smallest flood is given rank 1 and the largest flood rank N.
- (2) For each flood a probability of non-exceedence was assigned to it based on its position in the ranked series. If the distribution is assumed to be a Type 1 extreme value (EVI or Gumbel) then a good approximation to the non-exceedence probability is given by the Gringorten formula:-

$$F_1 = \frac{1 - 0.44}{N + 0.12}$$

where F_1 is the non-exceedence probability or plotting position. The EVI reduced variate, y_1 , is calculated from the formula

$$y_1 = -\ln(-\ln F_1)$$

- (3) Normally the annual maximum series was standardized by dividing by the mean of the series. However, if the annual maximum series contained one or more extreme floods, the mean of the series might have been too high an estimate of the true long term mean (the MAF).

In this case the series was standardized by dividing by $Q_{med} \times 1.07$. (Q_{med} is the median flood in the series). The series was deemed to contain an extreme flood and was therefore standardized by the second method if Q_{max} , the maximum flood on record, is greater than three times Q_{med} . The multiplier 1.07 was the average ratio of mean annual flood to median annual flood for all catchments in the UK*.

- (4) An average growth curve for the country or region was produced by taking the mean reduced variate and mean Q/MAF from all stations within each interval of reduced variate. The intervals of reduced variate used were -1.5 to -1.0, -1.0 to -0.5, -0.5 to 0 etc.
- (5) The growth curve for the country or region was extended by considering the five largest Q/MAF values in the data set and plotting these as the five largest values in a supposedly independent sample.
- (6) A general extreme value function was fitted to the points obtained in steps (4) and (5) above such that

$$Q/MAF = u + \alpha \left(\frac{1 - e^{-ky}}{k} \right)$$

where

- y = reduced variate
- u = intercept of fitted curve
- α = scale parameter of fitted curve.
- k = curvature of the curve.

*The same multiplier, 1.07, was used in all other countries as was the test for extreme floods at 3 times Q_{med} . It would have been preferable to adjust these two factors to suit each region. Although this may still be done at a later date, a more satisfactory and consistent method of standardisation might be to standardise by division of the median (See Section 5).

(7) The fitted equation was used to estimate growth factors up to return periods of about twice the record length.

As stated above, the same procedure for analysis was adopted for all stations in all countries. The results are summarized in Table 2.

Catchment data

Some basic catchment characteristics are held on file for each station and these are as follows:

Item

Characteristic

Station number. This is a six character identifier for the station. The first 3 characters signify the country and correspond to the code letters for that country given in Table 1. The second three characters are the station number in that country. Thus JAV004 is station 4 in Java. (The river name and location associated with each number are given in Appendix B).

Number of years data. This is the length of the annual maximum flood series for the station.

MAF. The mean annual flood for the station in m^3s^{-1} calculated as described in step (3) above.

Catchment area (km^2).

Slope. Mean slope of the river as defined by UNESCO:

$$\text{slope} = \frac{H_1 - H_n}{10L}$$

where L is the length of the river (km); H_1 and H_n are the maximum and minimum elevations respectively (m).

Item

Characteristic

Annual average precipitation on the catchment (mm).

Annual runoff (mm)

Hundred year return period flood. This is expressed as the ratio $Q(100)/MAF$.

$Q(100)/MAF$ was estimated as follows. The individual station flood frequency curve was produced as described in steps (1) to (3) in Section 3. A partially smoothed curve was produced for the station as outlined in step (4) above and a final smooth curve drawn through these points by eye. $Q(100)/MAF$ was not estimated for stations with less than 10 years of data because extrapolation to 100 year return period was considered excessive.

4. Data summary

Regional growth curves were produced as outlined in Section 2 and are shown in Figure 1 for UNESCO data and Figure 2 for data from other sources. Table 2 gives a summary of the fitted growth curve (EVI) parameters and the estimated Q_{100}/MAF for each country. Figure 2 also shows regional growth curves for Finland and New Zealand (East and West). Although we do not have the basic data for these regions the analysis has been undertaken in a similar way to the other regions in this report.

Appendix B gives additional information concerning the stations used in the analysis for each country. A list of stations names and catchment characteristics is given together with the results of fitting an EVI curve to the regional data set. The five largest floods in the region and their locations are also identified.

Regional Growth Curves
 Source: "World catalogue of very large floods"
 UNESCO 1976

(n/m) n = station
 m = station years

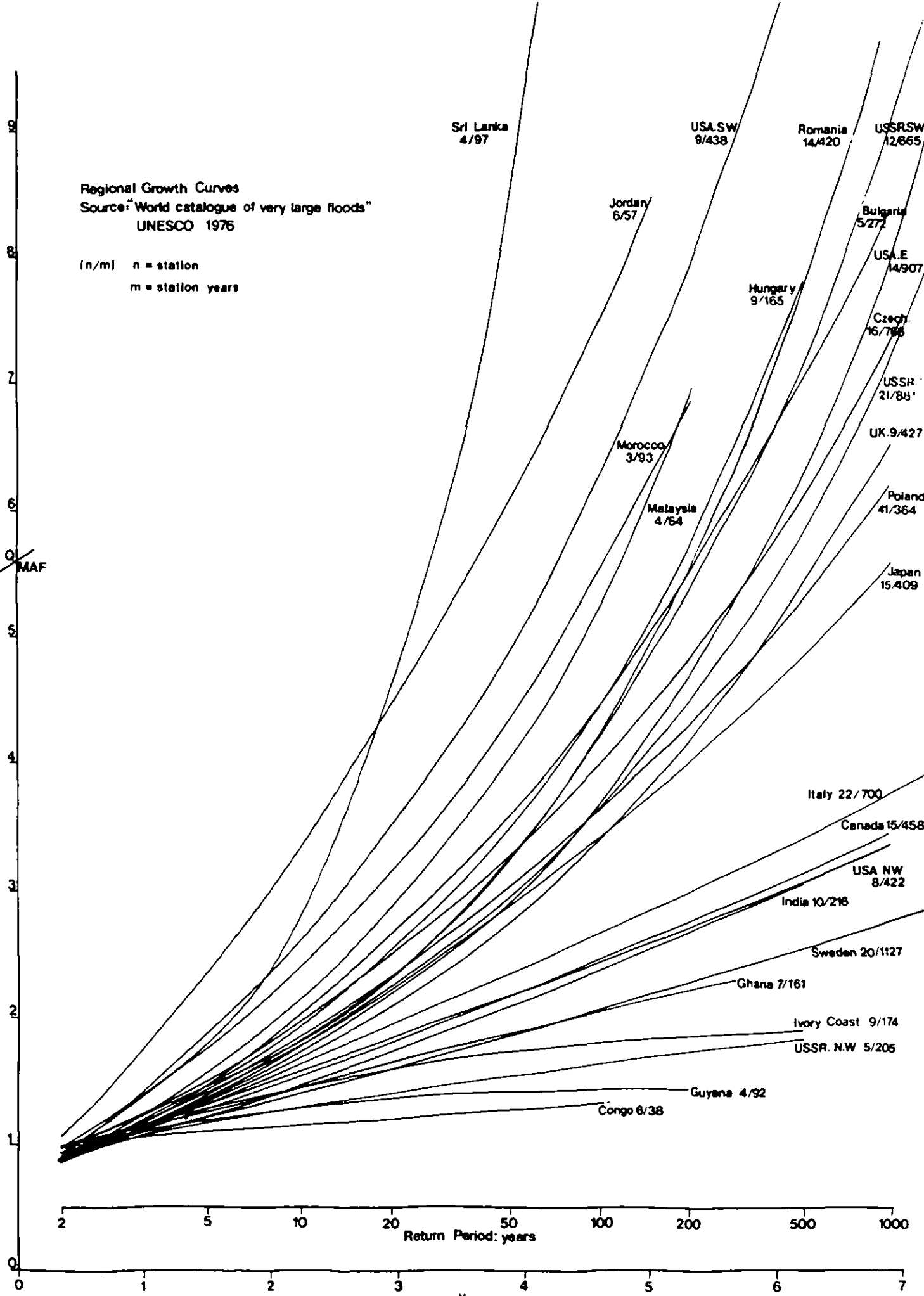


Figure 1

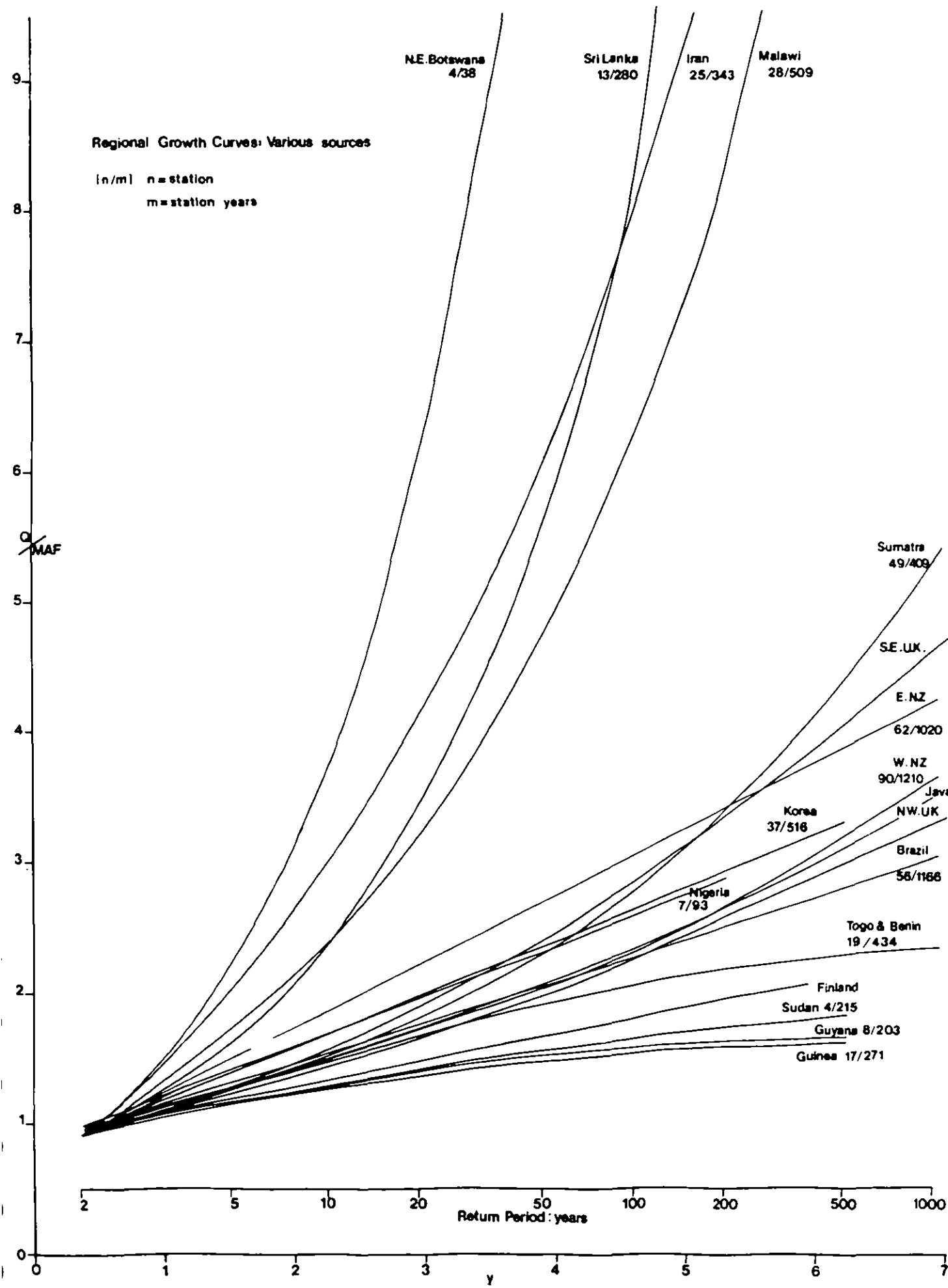


Figure 2

SUMMARY OF RESULTS

COUNTRY	RECORD LENGTH (years)	MEAN AREA (km ²)	Q ₁₀₀ /MAF	GEV PARAMETERS		
Bangladesh	15	Combined with India				
Botswana	38	2448	16.94	0.569	0.674	-0.5952
Brazil	1166	8930	2.28	0.823	0.310	-0.0109
Bulgaria	277	4497	4.60	0.777	0.500	-0.2050
Canada	458	11982	2.44	0.860	0.286	-0.0764
Czechoslovakia	766	5435	3.98	0.805	0.398	-0.2211
Ghana	161	110854	2.08	0.839	0.310	0.0605
Guinea	271	10254	1.55	0.908	0.228	0.2309
Guyana	203	21188	1.54	0.914	0.204	0.1877
Hungary	165	47370	4.22	0.805	0.275	-0.3781
India & Bangladesh	231	225182	2.37	0.839	0.274	-0.0829
Iran	343	13197	8.02	0.751	0.681	-0.3262
Italy	700	6322	2.67	0.814	0.354	-0.0546
Ivory Coast	193	46264	1.82	0.861	0.396	0.3191
Japan	409	4437	3.42	0.775	0.396	-0.1527
Java	607	1400	2.34	0.848	0.239	-0.1259
Jordan	57	4238	7.50	0.715	0.942	-0.1823
Korea	508	6552	2.63	0.799	0.377	-0.0235
Malaysia	64	5877	5.27	0.801	0.375	-0.3637
Malawi	509	2036	6.25	0.775	0.444	-0.3754
Morocco	93	8237	5.48	0.779	0.536	-0.2559
Nigeria	93	16981	2.61	0.646	0.373	-0.0113
Poland	364	39333	3.61	0.783	0.390	-0.1845
Romania	420	49111	4.47	0.837	0.328	-0.3380
Sudan	215	105250	1.66	0.901	0.205	0.0963
Sumatra	409	1400	2.79	0.850	0.202	-0.2891
Sri-Lanka	280	1687	8.31	0.823	0.347	-0.5586
Sweden	1127	7806	2.09	0.854	0.250	-0.0299
Togo & Benin	433	11471	2.05	0.832	0.424	0.2238
United Kingdom	427	3170	3.38	0.793	0.283	-0.2711
USA/SW	438	55414	7.75	0.798	0.439	-0.4592
USA/E	907	288947	3.66	0.796	0.253	-0.3463
USA/NW	422	104550	2.45	0.812	0.308	-0.0603
USSR/SW	655	20369	4.44	0.783	0.430	-0.2444
USSR/E	811	232517	3.67	0.818	0.305	-0.2788
USSR/NW	205	568540	1.63	0.905	0.201	0.1071

TABLE 2

For some countries some additional notes are required to provide explanation of the data or work carried out. This information is given in Appendix B.

Future work

A considerable amount of time and effort has gone into the first phase of this project in developing a system of storage and analysis. The second phase will be able to draw on this large data base and try to come up with some conclusion on the factors which influence the increase of flood magnitude with return period on a world wide basis. This will be of benefit mainly in third world countries, where flood estimation is a difficult task due to insufficient data. The following are suggested directions of future work.

- (1) Method of analysis. At present, the standard UK Flood Study method of analysis has been applied to the data. This has some drawbacks in the way in which data are standardised when applied to worldwide data. The method of standardisation has been described in Section 2 (step (3)). The test for an outlier, while suitable for the UK, may be unsatisfactory for flood series from different climatic regions. In particular regions with a higher coefficient of variation (CV) of the flood series (typically the more arid countries) have many floods greater than three times the median. Another problem is the multiplier 1.07 which is derived for the UK and has been applied throughout. Strictly this should be derived for each region as the mean ratio of mean to median flood. Again the biggest departure from the 1.07 used will come in regions with a high CV. Furthermore the use of the mean as a standardiser implies that Q/MAF can never exceed the length of record (ie a 10 year record cannot have Q/MAF in excess of 10).

It is suggested here that a better way to standardise the data might be to use the median flood throughout. But the problem should be considered more carefully in the next phase.

- (2) Having decided upon the method of standardisation multiple regressions should be carried out relating the standard catchment flood to catchment characteristics. It may be useful to consider different climatic regions or other groupings of catchment (eg on catchment area) in this stage.
- (3) The shape of individual station growth curves could be related to catchment characteristics. This may be investigated by regression analysis. $Q_{(100)}/MAF$ has already been abstracted for the stations in this study. This might be a useful starting point for prediction:

$$Q_{(100)}/MAF = f (MAF, AREA, SLOPE, RAINFALL)$$

Other return period floods could be abstracted to expand the relationship

$$Q_{(T)}/MAF = f (T, MAF, AREA, SLOPE, RAINFALL)$$

- (4) Finally the archive system should remain open and expanded as data are obtained from additional stations throughout the world.

APPENDIX A. Computer System

A1. Introduction

This appendix is a guide to the micro-computer system developed for storage and analysis of the World Flood Study data. It is assumed that the reader is familiar with the Research Machines 380Z computer and its operating system, CP/M.

A number of discs are required to store data from the many stations used in this study. Discs are in pairs and are labelled (1,1A), (2,2A), (3,3A) etc. Table A1 shows which countries are on each disc. Paired discs (bracketted) are always used with the non "A" disc in the top disc drive and the "A" disc in the bottom drive. The non "A" disc contains the annual maximum data. The "A" disc contains the individual station grouped growth curves.

The disc in the top drive also contains two programs ADD and STATS. Program ADD is the main data entry program to the system which creates new stations in the system, adds and edits annual maximum data. Program STATS is the first statistical analysis program in the system and follows the procedure described in steps (1) to (3) in Section 2 of this report. The grouping procedure described in step (4) is then undertaken for each station.

To summarise by way of an example, data are added for a station in India by inserting disc 2 in the top drive and 2A in the bottom drive (Table A1). Program ADD is run to enter the data and then program STATS is executed to process the data.

A combined regional flood frequency curve is produced by firstly creating an index file of station numbers on disc 20 and running the program called COMBO (also on disc 20). COMBO is run after data from all the stations have been entered and processed using the programs ADD and STATS. Disc 20 is always used in the top disc drive and the growth curve discs (the "A" series) inserted in the bottom drive.

The programs ADD, STATS and COMBO are now described in more detail.

LIST OF WORLD FLOOD STUDY DISCS

<u>CODE</u>	<u>COUNTRY</u>	<u>UPPER DISC</u> ("AM" Files)	<u>LOWER DISC</u> ("GC" Files)
AUS	AUSTRALIA	8	8A
BAN	BANGLADESH	1	1A
BOT	BOTSWANA	5	5A
BRA	BRAZIL	10	10A
BUL	BULGARIA	1	1A
CAN	CANADA	1	1A
CON	CONGO	1	1A
CZE	CZECHOSLOVAKIA	1	1A
GHA	GHANA	1	1A
GUI	GUINEA	6	6A
GUY	GUYANA	2	2A
HUN	HUNGARY	2	2A
IND	INDIA	2	2A
IRA	IRAN	9	9A
ITA	ITALY	2	2A
IVO	IVORY COAST	2	2A
JAP	JAPAN	3	3A
JAV	JAVA	8	8A
JOR	JORDON	3	3A
KOR	KOREA	11	11A
MAL	MALAYSIA	3	3A
MAW	MALAWI	11	11A
MOR	MOROCCO	3	3A
NIG	NIGERIA	4	4A
POL	POLAND	3	3A
ROM	ROMANIA	3	3A
SUD	SUDAN	4	4A
SUM	SUMATRA	7	7A
SRI	SRI LANKA	4	4A
SWE	SWEDEN	4	4A
TOG	TOGO & BENIN	9	9A
UNI	UNITED KINGDOM	5	5A
USA	USA	6	6A
USS	USSR	5	5A

- Notes:
- (1) "AM" Files - annual maximum data
 - (2) "GC" Files - growth curve data
 - (3) Additionally there are 8 stations from BODGHAT, INDIA on discs 9 and 9A.
 - (4) For system expansion create discs pairs (12,12A), (13, 13A) etc.
 - (5) COMBO and the regional index files are on disc 20.

A.2. Program ADD

Program ADD performs several functions, all of which are concerned with the entry and editing of annual maximum flood data:

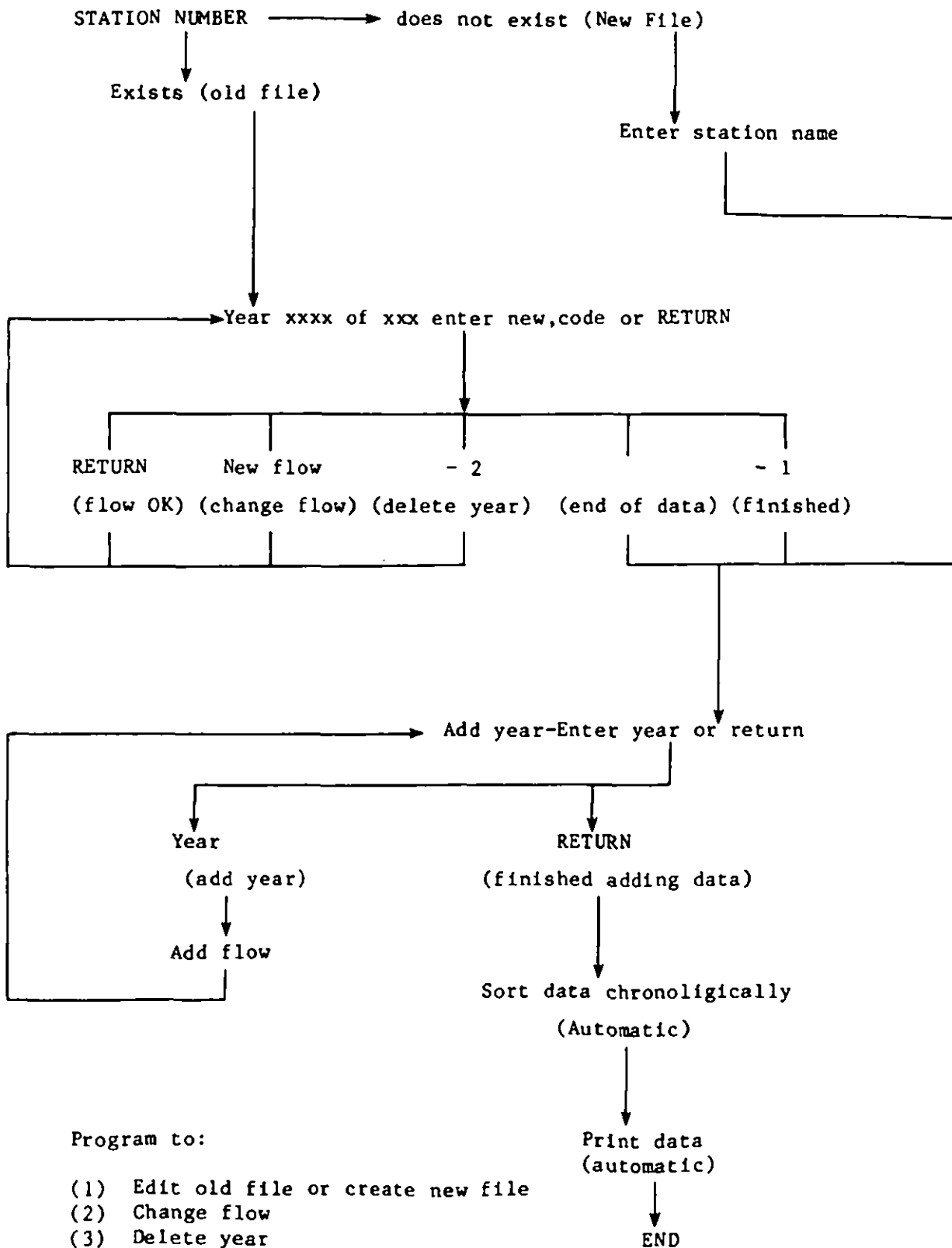
- (1) Creation of a new station annual maximum file
- (2) Entry of new annual maximum data
- (3) Change of individual flood peaks
- (4) Deletion of years from record
- (5) Chronological sort of data
- (7) Printing of data.

To run program ADD, insert the appropriate disc for the country (Table A1) into the disc drives, type [CTRL + C] and then type ADD. Figure A1 is the flow chart for the program.

If a file for the station exists on the current disk the program automatically begins by editing the old file. If a file of the station is not present a new station is assumed and the operator enters the station name followed by the new annual maximum series data. The station number is as defined in Section 3 (Item 1).

In edit mode (ie file already exists) the data are displayed one year at a time and a request made to enter new, code or [RETURN]. If the flow is to be changed enter new value, if OK just type [RETURN]. To delete the year enter -2. Edit mode is left either by reaching the end of the data in the file or by typing -1 at any stage.

Program ADD



Program to:

- (1) Edit old file or create new file
- (2) Change flow
- (3) Delete year
- (4) Add year
- (5) Sort data
- (6) Print out data

NB: ABORT EDIT = [CTRL + C] at any stage.

Figure A1.

Add mode is automatically entered both for a new station and also after edit mode for an old station. Add mode enables additional years of record to be inserted in the record. If this is not required (for an old file) type [RETURN] and the program enters the exist sequence. Data may be added by typing the year followed by the annual maximum. Data entry is terminated by typing [RETURN] to the request for a new year number. The program then enters the exit sequence.

The exit sequence involves sorting the data into chronological order, saving the data on file and presenting a summary on the printer. The sort means that data may be deleted, added or changed at will and the file saved will always be in chronological order.

Typing [CTRL + C] to any prompt in program ADD will abort the program without any changes being made to the file.

A.3. Program STATS

This is the first statistical analysis program in the system and follows steps (1) to (3) in Section 2 of the report and the grouping procedure describe in step (4) from the same section.

Program STATS can process one or more stations of "AM" (Annual maximum) data after the program ADD has been used to enter data onto the system.

The discs required are the same as for program ADD. STATS is run by typing STATS.

The first prompt requires the number of stations to process, the second and subsequent prompts require the list of station numbers. The station numbers are the same as used in program ADD.

There is a comprehensive and self explanatory output to the printer and the grouped flood frequency curve is stored on a "GC" (Growth Curve) file on the "A" or lower disc.

A.4. Program COMBO

Program COMBO produces a regional growth curve from a group of stations specified in an index "IN" file.

Initially the index file must be set up on disc 20. Insert this disc into the top drive and type [CTRL + C]. The index files are created and amended using the Research Machines text editor and are stored on the under side of disc 20. The editor is also on this side of the disc so the CP/M commands necessary to create or amend index files are:

```
A  [CTRL + C]
A  C:
C  EDIT  INxxxyyy.DAT (where xxx is the country code,
                        yyy are optional)

    Edit file
    EX  (Exit from edit)
C  A:
A
```

The structure of the index file is illustrated below by way of an example. A regional index file is required for 4 stations in Sri Lanka, the file name is INSRIA.DAT, and contains the following fine lines.

```
Sri Lanka Stations (group A)    -One line title of group
SRI101 4A                        )
SRI102 4A                        ) List of station numbers
SRI103 4A                        ) (in CAPS followed by
SRI104 4A                        ) one space and disc number)
```

An index file may contain stations from any of the discs. It is therefore possible to produce a combined growth curve from stations in more than one country.

Having created the index file program COMBO may be run by typing COMBO. Program COMBO then requests the name of the index file which is entered from the keyboard in the form xxxyyy (ie without the "IN" and the .DAT extension). The index file is scanned and the program pauses with a request to load the first disc on the list. The appropriate "A" disc is then loaded into the bottom drive and [RETURN] entered from the keyboard. An incorrect disc in the bottom drive will result in the request for disc being repeated. If a disc change is required during read of data the program pauses and requests the loading of the next disc. A comprehensive and self-explanatory printer output is produced by COMBO.

A.5. System expansion

The maximum storage on a Research Machine 380Z disc is currently 72k bytes per side. There is also a directory limit of about 60 files per disc side. If either limit is reached no more files may be added. The system program STAT (not to be confused with STATS) may be used to determine the status and storage on any disc.

Most discs currently in use are almost full; therefore addition of further large numbers of stations will require setting up another disc pair (initially 12 and 12A). This is done by formatting fresh discs, copying CP/M to each disc and CONFIGuring CP.M to have parallel printer as default (Printer type 3). The top of the non "A" disc should have files ADD.COM, STATS.COM and STAT.COM copied across (using PIP). The editor (on the bottom side of disc 20 (ie C:EDIT)) should then be used to create a one line file called DISC.SYS on the bottom of both new discs. The first 4 characters on the line are the disc identifier. The remainder of the line may be used to explain the code. Thus DISC.SYS for disc 12A would contain one line:

```
12A World Flood Study disc 12A
```

The discs may then be used to add further data to the system.

A.6 Catchment characteristics

Catchment characteristics are stored in two files STATIONS.DAT (top side of disc 1A) and STATION2.DAT (top side of disc 3A). These files are added to or amended by the editor (EDIT) located on the bottom side of discs 1A and 3A. As both these files are now quite large an additional file (STATION3.DAT) on disc 7A and currently empty, may be used to add catchment characteristics for a large block of new stations. Back up files of the 3 station files should be made periodically and onto discs 2A, 4A and 8A respectively.

A.7 FORTTRAN sources

The FORTRAN source listing for the following programs can be found on the following discs:

Program	Source	Backup
ADD	2 (Top)	3 (Top)
STATS	1 (Top)	4 (Top)
COMBO	20 (Top)	5 (Top)

A.8 Honeywell backup

At the end of 1983 all "AM" and "STATION" files were being transferred to the Honeywell as a safety backup. The work is being undertaken by Colin Fraser and the files archived under OS/COLIN/. The "AM" files are being transferred merely as a backup, but the "STATION" files will also be used as the basis of the regression analysis to be carried out in Phase II.

APPENDIX B. Data listing

B.1 Introduction

This Appendix provides a summary listing of the data collected and analysed so far for this study. It is not possible, because of space limitations to provide a station by station analysis of data. The following information is, however, included for each country.

<u>Item</u>	<u>Information</u>
(1)	Additional qualification necessary to understand the processing of data for that country (optional)
(2)	A list of station numbers, names and years of record for each country
(3)	A list of catchment characteristics for the stations.
(4)	A description of the GEV line fitted to the regional curve. The three curve parameters are given, details of the grouping procedure and the five highest Q/MAF in the region. The table headed 'Predictions for various return periods' has been evaluated from the fitted GEV curve. The first column is reduced variate 'y', the second is return period (T) in years, and the third is estimated Q/MAF.

The full computer listing and comments about individual stations are stored at IH in a series of blue computer paper binders. It is recommended that these be scanned carefully when

studying data from a particular country. Reference to these blue computer files is sometimes made in the 'Additional comments' section (Item (1) above) of the following listings.

B.2 Listings

Data from countries are in country code alphabetical order on the following pages.

Australia - additional notes

Insufficient number of stations at present for regional analysis. More stations pending entry.

Station Number	No. Yrs.	MAF 3 - 1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
AUS101	50	561	6455				7.87

Bangladesh - additional notes

At present there are only three stations for Bangladesh. These have been included with the stations for India for regional analysis:

Station number	Station name
BAN 101	Brahmaputra at Bahadurabad
BAN 102	Ganges at Hardinge Bridge
BAN 103	Meghna at Bhairab Bazar.

Refer to India.

 Combined Flood Frequency Analysis - World Flood Study 1983

N.E. BOTSWANA STATIONS

-----		-----
Catchment Name		No. of years
-----		-----
BOT101	Shashe at Weir	12
BOT102	Tati at Weir	10
BOT103	Inchwe at Weir	10
BOT104	Macloutse at Tobane	6
4	Stations	Total number of years 38

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
BOT101	12	382	2460	?	?	?	5.24
BOT102	10	217	570	?	?	?	5.46
BOT103	10	186	800	?	?	?	3.88
BOT104	6	665	5960	?	?	?	?

 General Extreme Value fit

Results of G.E.V. fitting to 38 station-years

Intercept U .569 Slope Alpha .674 Curvature K -.5952

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	1	-1.06	.097	.040	-.057
(-1.0, -.5)	6	-.77	.374	.154	-.220
(-.5, 0.0)	7	-.20	.579	.439	-.140
(0.0, .5)	5	.21	.779	.716	-.063
(.5, 1.0)	7	.68	1.083	1.137	.053
(1.0, 1.5)	5	1.27	1.388	1.852	.464
(1.5, 2.0)	2	1.83	2.164	2.794	.630
(2.0, 2.5)	2	2.19	2.720	3.615	.895
(2.5, 3.0)	2	2.88	10.315	5.724	-4.591
(3.0, 3.5)	1	3.06	3.194	6.443	3.249

5 HIGHEST FLOODS

5	BOT102	2.06	2.847	3.297	.450
4	BOT101	2.32	3.094	3.948	.854
3	BOT101	2.67	3.194	4.973	1.779
2	BOT102	3.20	8.175	7.050	-1.125
1	BOT103	4.21	12.454	13.352	.898

Predictions for various return periods

.37	2	.84
1.50	5	2.20
2.25	10	3.76
2.97	20	6.07
3.90	50	10.99
4.60	100	16.94

Brazil - additional notes

Flood data are from twice daily read staff gauges (not automatic charts).

An annual maximum series for the Amazon is stored in file BRA201. This was not included in the regional curve because of its very large catchment area and distant location from the other Brazilian stations. See also notes in blue computer file on adjustment of mean for this station.

 Combined Flood Frequency Analysis - World Flood Study 1983

BRAZIL STATIONS

	Catchment Name	No. of years
BRA101	Ibicui em passo Santa Victoria	22
BRA102	Rio Jaguari em passo do Loreto	22
BRA103	Rio Jacui em Dona Francisca	39
BRA104	Vacacai em Ponte Sao Gabriel	8
BRA105	Rio Vacacai em passo do Verde	6
BRA106	Rio Vacacai em passo das Tunas	36
BRA107	Rio Pardinho em Santa Cruz	13
BRA108	Rio Jacui em Rio Pardo	14
BRA109	Santa Rita em ponte Santa Rita	19
BRA110	Rio Taquari em Lajeado	37
BRA111	Rio Cai em passo Montenegro	37
BRA112	Sinos em Sao Leopoldo	5
BRA113	Rio dos Sinos em Campo Bom	28
BRA114	Gravatai em passo das Canoas	34
BRA115	Rio Piratini em Picada nova	12
BRA116	Rio Piranti em passo do Ricardo	14
BRA117	Pelotas em pte Cordairo Farias	14
BRA118	Arroio Fragata passo do Carros	12
BRA119	Passo Fundo em Jose Bonifacio	18
BRA120	Arroio Grande em ponte Ibiruba	17
BRA121	Jacui Mirim em ponte S. Antonio	19
BRA122	Jacui em passo do Lagoao	28
BRA123	Rio Jacui em Salto Grande	17
BRA124	Jacui em Volta Grande	11
BRA125	Rio Tainhas em Tainhas	28
BRA126	Ligeiro em passo do Ligeiro	21
BRA127	Pelotas passo do Virgilio	6
BRA128	Forquilha em passo Granzotto	21
BRA129	Ligeiro em passo Colombelli	39
BRA130	Passo Fundo em passo Fundo	8
BRA131	Uruguai em passo Caxambu	35
BRA132	Rio Uruguai em Irai	24
BRA133	Rio do Varzea em passo rio Varzea	29
BRA134	Rio Turvo em Engenho	19
BRA135	Cascata Burica em Cascata Burica	37
BRA136	Rio Santa Rosa em Tucunduva	35
BRA137	Rio Comandai em Linha Uniao	9
BRA138	Potiribu ponte Nova Potiribu	15
BRA139	Rio conceicao em Conceivao	36
BRA140	Rio Ijuí em Santo Angelo	37
BRA141	Rio Ijuí em passo Viola	28
BRA142	Rio Santa Maria em Dom Pedrito	19
BRA143	Rio Santa Maria em Rosario do Sul	11
BRA144	Rio Itu em Cachoeira sta Cecilia	6
BRA145	Rio Itu em passo da Cachoeira	13

BRA146	Rio Ibirapuita em passo do Britos	5
BRA147	Rio Ibirapuita em Alegrete	34
BRA148	Rio Ijuí em passo Florida	8
BRA149	Rio Jaguari em Jaguari	33
BRA150	Rio Ibicuí em Jacaqua	10
BRA151	Arroio Miracatu ponte Miracatu	13
BRA152	Rio Ibicuí em Manuel Viana	11
BRA153	Rio Ibicuí em passo do Itaum	11
BRA154	Rio Ibicuí em passo Mariano Pinto	27
BRA155	Rio Toropi em Vila Clara	36
BRA156	Rio Toropi em ponte Toropi	20

56 Stations

Total number of years 1166

Station Number	No. Yrs.	MAF	Area	Slope	AAR	MAR	Q(100)
		3 -1 m s	2 km		mm	mm	----- MAF
BRA101	22	1103	5679	.189	1680	?	2.34
BRA102	22	961.5	4563	.237	1550	?	2.25
BRA103	39	2127	13975	.175	1600	?	2.17
BRA104	8	239	960	.407	1620	?	?
BRA105	6	433	5343	.191	1650	?	?
BRA106	36	598	6782	.163	1670	?	1.7
BRA107	13	149	816	.772	1700	?	1.18
BRA108	14	3716	36104	.134	1850	?	1.7
BRA109	19	78.4	325	.553	1690	?	2.8
BRA110	37	5615	23272	.276	1850	?	2.2
BRA111	37	569	5330	.530	1500	?	1.48
BRA112	5	176	3145	.545	1450	?	?
BRA113	27	272	2875	.633	1700	?	1.88
BRA114	34	65.4	1665	.257	1450	?	2.75
BRA115	12	843	2236	.444	1320	?	2.78
BRA116	14	1124	5396	.335	1300	?	2.24
BRA117	14	134	362	.956	1280	?	2.22
BRA118	12	43.8	132	.995	1270	?	2.54
BRA119	18	196	1980	.114	1750	?	2.36
BRA120	17	62.5	366	.326	1900	?	2.53
BRA121	19	192	758	.276	1880	?	2.53
BRA122	28	224	1555	.184	1850	?	2.4
BRA123	17	1424	8218	.192	1900	?	2.84
BRA124	11	2097	13265	.188	1800	?	2.88
BRA125	28	67.5	222	.331	2050	?	2.28
BRA126	21	151	537	.666	1700	?	2.24
BRA127	6	4255	29619	.240	1700	?	?
BRA128	21	327	1756	.308	1690	?	2.0
BRA129	39	977	3718	.294	1680	?	2.06
BRA130	8	712	3709	.204	1730	?	?
BRA131	35	9061	52832	.187	1750	?	3.02
BRA132	24	10693	62199	.169	1750	?	2.6
BRA133	29	1834	5356	.124	1860	?	1.86
BRA134	19	90.7	392	.186	1880	?	2.85
BRA135	37	583	2265	.290	1930	?	1.73
BRA136	35	244	1139	.290	1920	?	2.48
BRA137	9	433	1248	.218	1900	?	?
BRA138	15	115	628	.315	1850	?	2.45
BRA139	36	175	805	.318	1850	?	1.43
BRA140	37	794	5414	.150	1860	?	2.5
BRA141	28	1380	8883	.121	1865	?	2.66
BRA142	19	149	2101	.226	1340	?	2.25
BRA143	11	1408	11537	.108	1450	?	2.6
BRA144	6	321	1579	.358	1580	?	?
BRA145	13	333	2578	.265	1570	?	1.66
BRA146	5	302	3201	.153	1300	?	?
BRA147	34	693	5945	.126	1350	?	1.67
BRA148	8	1790	10033	.106	1865	?	?
BRA149	33	937	2244	.316	1650	?	2.48
BRA150	10	2066	27252	.084	1550	?	2.3
BRA151	13	70.7	365	.728	1590	?	1.84
BRA152	11	2174	28799	.077	1550	?	2.26
BRA153	11	2250	30478	.067	1545	?	2.24
BRA154	27	3326	42014	.062	1540	?	2.2
BRA155	36	456	2810	.340	1680	?	2.27
BRA156	20	573	3347	.262	1650	?	2.2

 General Extreme Value fit

Results of G.E.V. fitting to 1166 station-years

Intercept U .823 Slope Alpha .310 Curvature K -.0109

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	68	-1.20	.386	.454	.068
(-1.0, -.5)	144	-.74	.560	.596	.036
(-.5, 0.0)	213	-.25	.761	.747	-.014
(0.0, .5)	204	.25	.934	.899	-.035
(.5, 1.0)	174	.74	1.096	1.052	-.044
(1.0, 1.5)	129	1.23	1.218	1.207	-.011
(1.5, 2.0)	82	1.73	1.343	1.363	.019
(2.0, 2.5)	61	2.21	1.442	1.516	.074
(2.5, 3.0)	35	2.72	1.645	1.679	.034
(3.0, 3.5)	26	3.19	1.718	1.827	.109
(3.5, 4.0)	16	3.72	2.103	1.997	-.106
(4.0, 4.5)	14	4.16	2.006	2.141	.136

5 HIGHEST FLOODS

5	BRA148	5.54	2.457	2.592	.135
4	BRA114	5.79	2.463	2.674	.211
3	BRA140	6.12	2.508	2.783	.275
2	BRA131	6.64	2.907	2.954	.047
1	BRA121	7.64	4.955	3.289	-1.666

Predictions for various return periods

.37	2	.94
1.50	5	1.29
2.25	10	1.53
2.97	20	1.76
3.90	50	2.06
4.60	100	2.28
5.30	200	2.51
6.21	500	2.81
6.91	1000	3.04

 Combined Flood Frequency Analysis - World Flood Study 1983

Bulgarian stations

	Catchment Name	No. of years

BUL101	maritza at belovo	59
BUL102	mativir at sersem kale	41
BUL103	striama at bania	57
BUL104	tchepelarska at batchkovo	58
BUL105	maritza at harmanli	57
5	Stations	Total number of years 272

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
BUL101	59	111	741	3.4	750	365	4.75
BUL102	41	52.4	386	0.69	578	104	4.25
BUL103	57	84.5	933	1.04	795	280	3.7
BUL104	58	109	825	1.60	794	394	4.88
BUL105	57	826	19700	0.97	663	165	2.35

 General Extreme Value fit

Results of G.E.V. fitting to 272 station-years

Intercept U .777 Slope Alpha .500 Curvature K -.2050

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-2.0, -1.5)	4	-1.53	.196	.119	-.076
(-1.5, -1.0)	15	-1.16	.317	.260	-.058
(-1.0, -.5)	33	-.72	.478	.444	-.034
(-.5, 0.0)	48	-.24	.656	.658	.002
(0.0, .5)	48	.24	.885	.902	.017
(.5, 1.0)	39	.73	1.158	1.170	.012
(1.0, 1.5)	31	1.23	1.417	1.474	.057
(1.5, 2.0)	21	1.75	1.783	1.829	.046
(2.0, 2.5)	12	2.26	2.041	2.216	.176
(2.5, 3.0)	7	2.69	2.839	2.567	-.272
(3.0, 3.5)	5	3.13	3.215	2.972	-.242
(3.5, 4.0)	4	3.62	3.543	3.465	-.078
(4.0, 4.5)	1	4.29	4.730	4.215	-.515
(4.5, 5.0)	4	4.63	4.294	4.642	.348

5 HIGHEST FLOODS

5	BUL102	4.08	4.730	3.967	-.763
4	BUL104	4.33	4.832	4.262	-.570
3	BUL101	4.66	5.212	4.679	-.533
2	BUL101	5.18	5.527	5.392	-.135
1	BUL101	6.18	6.380	6.998	.618

Predictions for various return periods

.37	2	.97
1.50	5	1.65
2.25	10	2.21
2.97	20	2.82
3.90	50	3.76
4.60	100	4.60
5.30	200	5.56
6.21	500	7.05

 Combined Flood Frequency Analysis - World Flood Study 1983

Canadian stations

	Catchment Name	No. of years

CAN101	chilliwack river at 08mh016	39
CAN102	slocan at 08nj013	39
CAN103	chilko at 08ma001	43
CAN104	kettle at 08nn013	40
CAN105	skeena at 08ef001	20
CAN106	fraser at 08kb001	21
CAN107	thompson at 08lf051	21
CAN108	castle at 05aa002	25
CAN109	clearwater at 05db001	26
CAN110	athabasca at 07be001	27
CAN111	sprague at 05od031	44
CAN112	rocky at 02zk001	23
CAN113	st. francis at 01ad003	21
CAN114	northeast magaree at 01fb001	30
CAN115	st. john at 01ad002	39

15 Stations Total number of years 458

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 Km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
CAN101	39	69.5	339	4.1	1570	1170	1.8
CAN102	39	467	3280	1.4	529	842	1.7
CAN103	43	308	8370	1.2	422	351	1.65
CAN104	40	356	5750	1.1	520	233	1.7
CAN105	20	5458	42200	0.4	601	689	1.55
CAN106	21	3387	32400	0.5	631	814	4.7
CAN107	21	3029	55900	0.7	531	448	4.0
CAN108	25	155	826	1.7	539	665	4.1
CAN109	26	163	3130	1.1	655	258	3.7
CAN110	27	1936	10400	0.9	458	554	1.75
CAN111	44	18.2	438	0.1	579	128	2.2
CAN112	23	119	285	0.5	1450	1220	2.6
CAN113	21	196	1350	0.4	905	566	1.85
CAN114	30	264	368	0.9	1300	1440	1.3
CAN115	39	2263	14700	0.1	964	571	1.84

 General Extreme Value fit

Results of G.E.V. fitting to 458 station-years

Intercept U .860 Slope Alpha .286 Curvature K -.0764

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	30	-1.22	.531	.528	-.003
(-1.0, -.5)	56	-.72	.660	.659	-.001
(-.5, 0.0)	81	-.25	.792	.790	-.002
(0.0, .5)	80	.24	.920	.929	.010
(.5, 1.0)	69	.73	1.064	1.075	.011
(1.0, 1.5)	50	1.23	1.236	1.230	-.006
(1.5, 2.0)	33	1.72	1.411	1.388	-.023
(2.0, 2.5)	23	2.22	1.609	1.552	-.057
(2.5, 3.0)	15	2.72	1.755	1.727	-.028
(3.0, 3.5)	6	3.27	1.750	1.924	.174
(3.5, 4.0)	9	3.74	2.149	2.099	-.050
(4.0, 4.5)	6	4.28	1.883	2.311	.428

5 HIGHEST FLOODS

5	CAN111	4.61	2.916	2.441	-.475
4	CAN110	4.85	2.922	2.543	-.379
3	CAN109	5.19	3.211	2.683	-.528
2	CAN111	5.70	3.212	2.908	-.304
1	CAN108	6.70	3.287	3.368	.081

Predictions for various return periods

.37	2	.97
1.50	5	1.32
2.25	10	1.56
2.97	20	1.82
3.90	50	2.16
4.60	100	2.44
5.30	200	2.73
6.21	500	3.14
6.91	1000	3.47

Congo - Additional notes

The records for Congo (Brazzaville) comprised the 4-11 highest floods at each of six stations. The mean annual flood was estimated by plotting these floods at a Gringorten plotting position corresponding to the highest, second, third, etc, in the total length of record drawing a straight line through each series and thus estimating the mean annual flood. The derivation of the upper part of the regional curve then followed the normal procedure. This analysis may be found in the blue computer file on this country.

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
CON101	11	66572	3480000	?	?	360	1.35
CON102	6	406	2810	?	1460	652	?
CON103	6	267	6200	?	1850	1050	?
CON104	6	542	10800	?	1620	710	?
CON105	5	4530	158000	?	1600	358	?
CON106	4	3010	55000	0.13	1500	540	?

 Combined Flood Frequency Analysis - World Flood Study 1983

Czechoslovakian stations

	Catchment Name	No. of years
CZE101	Kamenice at Josefuv dul	54
CZE102	Smedava at Bily potok	17
CZE103	Cidlina at Novy Bydzov	38
CZE104	Berounka at Krivoklat	56
CZE105	Vitava-labe at Kamyk nad Vitavou	29
CZE106	Labe at Decin	114
CZE107	Zdechovka at Zdechov	44
CZE108	Becva at Teplice	53
CZE109	Morava at Kromeriz	57
CZE110	Dyje at Dolni Vestonice	52
CZE111	Vah at Lubochna	52
CZE112	Lubochnianka at Lubochna	42
CZE113	Turiec at Martin	42
CZE114	Kysuca at Cadca	49
CZE115	Celadenka at Celadna	20
CZE116	Ostravice at Sance	47
16	Stations	Total number of years 766

Station Number	No. Yrs.	MAF		Area	Slope	AAR mm	MAR mm	Q(100) ----- MAF
		3	-1					
		m	s	Km				
CZE101	54	24.9		26.0	6.09	1420	1130	5.23
CZE102	17	42.6		26.1	8.09	1470	1020	3.1
CZE103	38	28.8		452	1.10	642	138	2.1
CZE104	56	316		7422	2.87	593	135	3.05
CZE105	29	536		12200	1.80	687	201	4.35
CZE106	114	1722		51100	0.43	676	189	2.8
CZE107	44	1.8		4.08	10.5	971	474	10.3
CZE108	53	289		1280	0.89	981	377	2.6
CZE109	57	398		7010	0.86	718	222	1.95
CZE110	52	237		11700	0.22	590	112	3.8
CZE111	52	244		2130	1.23	1020	562	3.6
CZE112	42	16.5		118	4.39	1180	635	3.4
CZE113	42	88.2		827	1.11	945	410	3.05
CZE114	49	168		484	1.70	910	547	3.1
CZE115	20	16.0		31.1	0.79	1320	842	6.92
CZE116	47	74.9		146	0.48	1200	671	3.9

 General Extreme Value fit

Results of G.E.V. fitting to 766 station-years

Intercept U .805 Slope Alpha .398 Curvature K -.2211

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-2.0, -1.5)	7	-1.54	.319	.285	-.034
(-1.5, -1.0)	42	-1.21	.396	.383	-.014
(-1.0, -.5)	96	-.73	.537	.536	-.001
(-.5, 0.0)	135	-.25	.692	.709	.016
(0.0, .5)	138	.24	.882	.905	.023
(.5, 1.0)	112	.74	1.127	1.125	-.003
(1.0, 1.5)	84	1.24	1.406	1.371	-.035
(1.5, 2.0)	54	1.73	1.659	1.643	-.016
(2.0, 2.5)	40	2.23	1.979	1.954	-.024
(2.5, 3.0)	22	2.75	2.341	2.314	-.027
(3.0, 3.5)	13	3.25	2.811	2.699	-.112
(3.5, 4.0)	9	3.63	3.127	3.019	-.108
(4.0, 4.5)	7	4.34	3.841	3.709	-.132
(4.5, 5.0)	6	4.57	3.148	3.944	.796
(5.0, 5.5)	1	5.31	3.251	4.832	1.581

5 HIGHEST FLOODS

5	CZE107	5.12	4.645	4.591	-.054
4	CZE101	5.37	5.054	4.907	-.147
3	CZE115	5.70	5.189	5.353	.164
2	CZE107	6.22	7.363	6.122	-1.241
1	CZE107	7.22	8.326	7.885	-.441

Predictions for various return periods

.37	2	.96
1.50	5	1.51
2.25	10	1.97
2.97	20	2.48
3.90	50	3.27
4.60	100	3.98
5.30	200	4.81
6.21	500	6.12
6.91	1000	7.30

 Combined Flood Frequency Analysis - World Flood Study 1983

Ghanan stations

Catchment Name		No. of years
GHA101	volta at senchi	28
GHA102	white volta at pwalugu	20
GHA103	white volta at nawuni	20
GHA104	black volta at bamboi	17
GHA105	oti at saboba	20
GHA106	pra at twitu praso	29
GHA107	pra at mampong	27

7 Stations Total number of years 161

Station Number	No. Yrs.	MAF 3 - 1 m s	Area 2 Km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
GHA101	28	7291	394000	0.03	?	1230	2.25
GHA102	20	1081	63300	0.03	?	1230	1.6
GHA103	20	1633	92900	0.03	766	1230	1.45
GHA104	17	1433	134000	?	?	1230	2.7
GHA105	20	2016	70600	?	?	?	1.5
GHA106	29	808	20800	0.24	?	?	2.85
GHA107	27	44.3	378	0.24	?	?	2.35

 General Extreme Value fit

Results of G.E.V. fitting to 161 station-years

Intercept U .839 Slope Alpha .310 Curvature K .0605

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	10	-1.19	.371	.456	.085
(-1.0, -.5)	20	-.72	.634	.612	-.022
(-.5, 0.0)	28	-.25	.780	.763	-.017
(0.0, .5)	30	.25	.938	.917	-.021
(.5, 1.0)	24	.76	1.073	1.070	-.003
(1.0, 1.5)	17	1.26	1.194	1.215	.020
(1.5, 2.0)	10	1.71	1.301	1.344	.043
(2.0, 2.5)	9	2.18	1.491	1.473	-.018
(2.5, 3.0)	6	2.72	1.559	1.616	.058
(3.0, 3.5)	1	3.41	2.226	1.794	-.432
(3.5, 4.0)	6	3.74	1.765	1.877	.112

5 HIGHEST FLOODS

5	GHA107	3.55	1.896	1.830	-.066
4	GHA101	3.80	1.961	1.892	-.069
3	GHA107	4.13	1.987	1.973	-.014
2	GHA104	4.66	2.226	2.097	-.129
1	GHA106	5.66	2.472	2.325	-.147

Predictions for various return periods

.37	2	.95
1.50	5	1.28
2.25	10	1.49
2.97	20	1.68
3.90	50	1.92
4.60	100	2.08
5.30	200	2.24
6.21	500	2.44

 Combined Flood Frequency Analysis - World Flood Study 1983

GUINEA STATIONS

-----		-----
	Catchment Name	No. of years
-----		-----
GUI101	Diani au bac	6
GUI102	Niger Faranah	15
GUI103	Niger a Kouroussa	23
GUI104	Niandan a Kissidougou	21
GUI105	Niandan a Baro	22
GUI106	Milo a Kousankoro	15
GUI107	Milo a Keroua	7
GUI108	Milo a Kankan	26
GUI109	Tinkisso a Dabola	10
GUI110	Tinkisso a Tinkisso	20
GUI111	Niger a Tiguibery	27
GUI112	Sankarani a Mandiana	21
GUI113	Koukoure a Pont de Telimele	19
GUI116	Kakrima a Kondomboufou	6
GUI117	Badi au bac	7
GUI118	Koloute a Badera	15
GUI120	Fatala a Birdan	11
17	Stations	Total number of years 271

Station Number	No. Yrs.	MAF 3 - 1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
GUI101	6	497	4095	?	1967	?	?
GUI102	15	275	3160	?	1817	?	1.32
GUI103	23	1131	16560	?	1665	?	1.6
GUI104	21	244	1400	?	2100	?	2.0
GUI105	22	1181	12770	?	1859	?	1.85
GUI106	15	216	990	?	2013	?	1.88
GUI107	7	190	1695	?	1979	?	?
GUI108	26	799	9620	?	1877	?	1.54
GUI109	10	76.7	1260	?	1613	?	1.4
GUI110	20	305	6370	?	1529	?	1.22
GUI111	27	4634	67600	?	1649	?	1.72
GUI112	21	1141	21900	?	1698	?	1.52
GUI113	19	1839	10250	?	2017	?	1.92
GUI116	6	818	5550	?	1930	?	?
GUI117	7	1273	3240	?	2632	?	?
GUI118	15	408	2750	?	2005	?	1.7
GUI120	11	1066	5110	?	2503	?	2.66

 General Extreme Value fit

Results of G.E.V. fitting to 271 station-years

Intercept U .908 Slope Alpha .228 Curvature K .2309

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	14	-1.18	.610	.599	-.011
(-1.0, -.5)	36	-.73	.709	.726	.017
(-.5, 0.0)	46	-.25	.850	.850	-.000
(0.0, .5)	49	.23	.970	.959	-.011
(.5, 1.0)	41	.73	1.070	1.061	-.009
(1.0, 1.5)	33	1.25	1.154	1.156	.002
(1.5, 2.0)	17	1.76	1.253	1.238	-.015
(2.0, 2.5)	13	2.24	1.280	1.306	.025
(2.5, 3.0)	11	2.70	1.322	1.365	.043
(3.0, 3.5)	3	3.29	1.397	1.433	.036
(3.5, 4.0)	8	3.68	1.459	1.473	.014

5 HIGHEST FLOODS

5	GUI120	4.08	1.595	1.510	-.085
4	GUI106	4.33	1.608	1.532	-.076
3	GUI104	4.66	1.634	1.558	-.076
2	GUI105	5.18	1.662	1.596	-.066
1	GUI120	6.18	1.739	1.658	-.081

Predictions for various return periods

.37	2	.99
1.50	5	1.20
2.25	10	1.31
2.97	20	1.40
3.90	50	1.49
4.60	100	1.55
5.30	200	1.60
6.21	500	1.66

 Combined Flood Frequency Analysis - World Flood Study 1983

Guyana stations

-----		-----
	Catchment Name	No. of years
-----		-----
GUY101	Mazaruni at Apaikwa	28
GUY102	Potaro at Kaitaur Falls	28
GUY103	Demerara at Great Falls	28
GUY104	Demerara at Saka	26
GUY105	Essequibo at Plantain Island	28
GUY106	Mazaruni at Hillfoot	17
GUY107	Cuyuni at Kamaria Falls	31
GUY108	Berbice at Habru Falls	17
8	Stations	Total number of years 203

Station Number	No. Yrs.	MAF 3 - 1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
GUY101	28	2119	14038	0.18	2914	1680	1.38
GUY102	28	837	2642	0.25	4138	2340	1.51
GUY103	28	251	2460	0.37	2361	968	1.54
GUY104	26	322	4040	1.00	2371	891	1.41
GUY105	28	6408	66600	?	?	?	1.46
GUY106	17	3242	20720	?	?	?	1.43
GUY107	31	3365	53900	?	?	?	1.82
GUY108	17	279	5100	?	?	?	2.27

 General Extreme Value fit

Results of G.E.V. fitting to 203 station-years

Intercept U .914 Slope Alpha .204 Curvature K .1877

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	14	-1.18	.641	.644	.003
(-1.0, -.5)	23	-.71	.752	.758	.006
(-.5, 0.0)	35	-.26	.858	.859	.001
(0.0, .5)	37	.23	.967	.959	-.008
(.5, 1.0)	30	.72	1.060	1.052	-.008
(1.0, 1.5)	23	1.23	1.134	1.137	.003
(1.5, 2.0)	14	1.71	1.205	1.212	.007
(2.0, 2.5)	13	2.25	1.281	1.288	.008
(2.5, 3.0)	6	2.90	1.365	1.370	.005
(3.0, 3.5)	2	3.41	1.454	1.428	-.025
(3.5, 4.0)	5	3.89	1.350	1.478	.128
(4.0, 4.5)	1	4.01	1.657	1.489	-.168

5 HIGHEST FLOODS

5	GUY108	3.79	1.482	1.467	-.015
4	GUY107	4.04	1.615	1.492	-.123
3	GUY107	4.37	1.657	1.523	-.134
2	GUY108	4.89	1.676	1.567	-.109
1	GUY108	5.89	1.676	1.642	-.034

Predictions for various return periods

.37	2	.99
1.50	5	1.18
2.25	10	1.29
2.97	20	1.38
3.90	50	1.48
4.60	100	1.54
5.30	200	1.60
6.21	500	1.66

 Combined Flood Frequency Analysis - World Flood Study 1983

HUNGARY STATIONS

	Catchment Name	No. of years

HUN101	danube at pozsony	19
HUN102	RABA AT SZENTGOTTHARD	9
HUN103	TISZA AT VASAROSNAMENY	19
HUN104	TISZA AT SZOLNOK	20
HUN105	TISZA AT SZEGED	20
HUN106	SZAMOS AT CSENGER	20
HUN107	SAJO AT FELSOZSOLCA	19
HUN108	ZAGYVA AT JASZTELEK	19
HUN109	MAROS AT MAKO	20

9 Stations Total number of years 165

Station Number	No. Yrs.	MAF		Area	Slope	AAR mm	MAR mm	Q(100)
		3 -1	2					----- MAF
		m	s	Km				
HUN101	19	5867		131000	0.43	1500	475	2.4
HUN102	9	230		3080	0.89	859	210	?
HUN103	19	2069		25100	0.56	1070	613	2.25
HUN104	20	1842		73100	0.24	746	230	2.05
HUN105	20	2285		138000	0.19	709	185	1.95
HUN106	20	723		15300	0.38	756	240	2.8
HUN107	19	218		6440	0.49	693	155	2.4
HUN108	19	59.9		4210	0.34	565	53	6.52
HUN109	20	704		30100	0.12	707	160	2.55

 General Extreme Value fit

Results of G.E.V. fitting to 165 station-years

Intercept U .805 Slope Alpha .275 Curvature K -.3781

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	8	-1.22	.463	.537	.074
(-1.0, -.5)	22	-.74	.577	.627	.050
(-.5, 0.0)	29	-.25	.709	.739	.030
(0.0, .5)	30	.24	.884	.875	-.009
(.5, 1.0)	25	.74	1.118	1.041	-.077
(1.0, 1.5)	17	1.23	1.368	1.236	-.132
(1.5, 2.0)	13	1.74	1.542	1.493	-.059
(2.0, 2.5)	8	2.26	1.679	1.786	.107
(2.5, 3.0)	5	2.59	1.664	2.017	.353
(3.0, 3.5)	0	0.00	0.000	0.000	0.000
(3.5, 4.0)	8	3.55	2.907	2.861	-.047

5 HIGHEST FLOODS

5	HUN108	3.58	2.662	2.890	.228
4	HUN108	3.83	3.021	3.170	.149
3	HUN109	4.16	3.025	3.585	.560
2	HUN108	4.68	4.706	4.349	-.357
1	HUN106	5.68	6.493	6.318	-.175

Predictions for various return periods

.37	2	.91
1.50	5	1.36
2.25	10	1.78
2.97	20	2.32
3.90	50	3.26
4.60	100	4.22
5.30	200	5.47
6.21	500	7.71

India - additional notes

Three stations from Bangladesh are included in the regional curve for India.

As a separate sub-region within India, eight stations from the Bodghat area have been analysed. Their independent analysis is also shown here. Station numbers range from INDO01 to INDO08 for this sub-group.

 Combined Flood Frequency Analysis - World Flood Study 1983

INDIA & BANGLADESH STATIONS

	Catchment Name	No.of years
BAN101	brahmaputra at bahadurabad	4
BAN102	ganges at hardinge bridge	6
BAN103	meghna at bhairab bazar	5
IND101	MAHANANDI AT BARAMUL	23
IND102	TAPI AT KATHORE	23
IND103	NARMADA AT GARUDESHWAR	20
IND104	KRISHNA AT VIJAYAWADA	65
IND105	GODAVARI AT DOWLAISHWARAM	18
IND106	Kosi at Sunakhambi Kholā	21
IND107	BRAHMAPUTRA AT PANDU	15
IND108	CANCA AT FARRAKKA	19
IND109	BANKINADI AT BRIDGE NO.171	6
IND114	UMA AT BRIDGE NO.394	6

13 Stations Total number of years 231

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
BAN101	4	61025	4930	00748	2030	?	?
BAN102	6	48300	4770	.00482	1780	?	?
BAN103	5	12140	20700	.00245	3180	?	?

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
IND101	23	25721	127000	0.062	1410	436	1.9
IND102	23	8346	64400	0.092	759	265	3.85
IND103	20	25430	87800	0.054	1320	419	2.95
IND104	65	14768	257000	0.063	1390	217	2.1
IND105	18	34450	309000	0.046	1120	332	2.95
IND106	21	8177	66900	1.03	1670	777	2.5
IND107	15	50760	404000	0.25	2410	1222	1.6
IND108	19	55768	935000	0.266	1100	398	1.5
IND109	6	243	373	0.36	?	1200	?
IND114	6	517	350	0.37	?	900	?

 General Extreme Value fit

Results of G.E.V. fitting to 231 station-years

Intercept U .839 Slope Alpha .274 Curvature K -.0829

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-2.0, -1.5)	1	-1.56	.487	.439	-.048
(-1.5, -1.0)	10	-1.21	.561	.525	-.036
(-1.0, -.5)	31	-.74	.642	.642	.000
(-.5, 0.0)	40	-.25	.759	.770	.011
(0.0, .5)	41	.23	.895	.901	.007
(.5, 1.0)	35	.72	1.039	1.042	.003
(1.0, 1.5)	26	1.22	1.200	1.189	-.011
(1.5, 2.0)	17	1.73	1.333	1.349	.016
(2.0, 2.5)	14	2.26	1.518	1.519	.002
(2.5, 3.0)	6	2.67	1.770	1.657	-.113
(3.0, 3.5)	3	3.32	1.817	1.886	.069
(3.5, 4.0)	6	3.65	2.021	2.004	-.016
(4.0, 4.5)	0	0.00	0.000	0.000	0.000
(4.5, 5.0)	1	4.75	2.031	2.433	.402

5 HIGHEST FLOODS

5	IND102	3.92	2.217	2.105	-.112
4	IND105	4.17	2.264	2.200	-.064
3	IND103	4.50	2.281	2.330	.049
2	IND102	5.02	2.576	2.542	-.034
1	IND102	6.02	3.055	2.975	-.080

Predictions for various return periods

.37	2	.94
1.50	5	1.28
2.25	10	1.52
2.97	20	1.76
3.90	50	2.10
4.60	100	2.37
5.30	200	2.66
6.21	500	3.06

 Combined Flood Frequency Analysis - World Flood Study 1983

Stations in Bodhghat, India

	Catchment Name	No. of years

IND001	Indravati at Nowrangpur	15
IND002	Indravati at Jagdalpur	18
IND003	Indraviti at Chindmar	12
IND004	Kolab at Sandaput	10
IND005	Waiganga at Pairni	14
IND006	Wardha at Chugus	13
IND007	Penganga at Peng. Bridge	13
IND008	Neel Konda at Midadopalli	10
8	Stations	Total number of years 105

General Extreme Value fit

Results of G.E.V. fitting to 105 station-years

Intercept U .841 Slope Alpha .306 Curvature K -.0113

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	6	-1.11	.459	.504	.045
(-1.0, -.5)	13	-.72	.567	.621	.054
(-.5, 0.0)	19	-.23	.789	.770	-.019
(0.0, .5)	18	.24	.944	.916	-.029
(.5, 1.0)	16	.73	1.103	1.064	-.039
(1.0, 1.5)	11	1.22	1.252	1.216	-.036
(1.5, 2.0)	9	1.70	1.359	1.365	.005
(2.0, 2.5)	6	2.18	1.449	1.515	.067
(2.5, 3.0)	2	2.88	1.731	1.736	.005
(3.0, 3.5)		3.22	1.815	1.843	.029

5 HIGHEST FLOODS

5	IND007	3.12	1.685	1.311	.126
4	IND003	3.37	1.700	1.291	.191
3	IND001	3.70	1.701	1.337	.296
2	IND004	4.23	1.927	2.165	.238
1	IND001	5.23	3.043	2.483	-.554

Predictions for various return periods

1.37	2	1.95
1.50	5	1.30
2.25	10	1.54
2.37	20	1.76
3.90	50	2.06
4.60	100	2.28
5.30	200	2.51
6.21	500	2.81
6.31	1000	3.04

 Combined Flood Frequency Analysis - World Flood Study 1983

IRAN STATIONS

	Catchment Name	No. of years
IRA101	Gom at Abbas-Abad	29
IRA102	Golpaygan at Sarab-Hinde	19
IRA103	Abshineh at Yalpan	17
IRA104	Vafregan at Band-Shah Abbas	12
IRA105	Jaj Rud at Latian	30
IRA106	Hableh Rud at Bonekuh	12
IRA107	Kordan at Deh Someh	13
IRA108	Karaj at Sira	18
IRA109	Zayandeh Rud at Pol-e-Mazraeh	6
IRA110	Mayn at Zarghemabad	5
IRA111	Kur at Cam Riz	10
IRA112	Zayandeh Rud at Pol-e-Kaleh	9
IRA113	Kor at Ahmad Abad	7
IRA114	Marbareth at Dehkadeh-Shahid	8
IRA115	Zayandeh Rud at Pol-e-Zamankhan	9
IRA116	Ghah Rud at Gabrabad	4
IRA117	Kharkkeh at Hamidieh	14
IRA118	Karun at Pol-e-Shalu	13
IRA119	Karun at Gotvand	22
IRA120	Karun at Ahwaz	15
IRA121	Bohlul at Batvand	7
IRA122	Allah at Jokanak	14
IRA123	Marun at Behbehan	16
IRA124	Jarrahi at Mashrageh	14
IRA126	Zohreh at Deh Molla	20
25	Stations	Total number of years 343

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
IRA101	29	38.5	10230	.820	255	?	11.8
IRA102	19	22.5	1150	2.00	434	?	10.2
IRA103	17	34.2	213	7.20	358	?	12.75
IRA104	12	99	17800	.780	314	?	6.82
IRA105	30	78.1	710	5.70	559	?	5.6
IRA106	12	70.1	3195	2.40	361	?	9.48
IRA107	13	52.4	380	8.00	398	?	4.44
IRA108	18	77.6	725	5.10	738	?	3.84
IRA109	6	135.8	?	?	?	?	3.6
IRA110	5	13.9	?	?	?	?	?
IRA111	10	149.6	?	?	?	?	11.85
IRA112	9	88.8	?	?	?	?	?
IRA113	7	88.8	?	?	?	?	?
IRA114	8	44.4	?	?	?	?	?
IRA115	9	83.5	?	?	?	?	?
IRA116	4	4038	?	?	?	?	?
IRA117	14	799	45900	?	?	?	3.88
IRA118	13	1265	22900	?	?	?	2.97
IRA119	22	2155	31900	?	?	?	4.36
IRA120	15	2315	60800	?	?	?	3.6
IRA121	7	201	782	?	?	?	?
IRA122	14	406	2220	?	?	?	2.86
IRA123	16	814	3650	?	?	?	5.81
IRA124	14	934	9200	?	?	?	1.94
IRA125	8	324	?	?	?	?	?
IRA126	20	911	12600	?	?	?	3.05

 General Extreme Value fit

Results of G.E.V. fitting to 343 station-years

Intercept U .751 Slope Alpha .681 Curvature K -.3262

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	18	-1.15	.298	.097	-.201
(-1.0, -.5)	45	-.72	.445	.313	-.131
(-.5, 0.0)	59	-.24	.619	.591	-.027
(0.0, .5)	64	.25	.851	.927	.075
(.5, 1.0)	50	.75	1.200	1.326	.126
(1.0, 1.5)	38	1.24	1.702	1.791	.090
(1.5, 2.0)	23	1.71	2.320	2.313	-.006
(2.0, 2.5)	20	2.22	2.698	2.966	.269
(2.5, 3.0)	10	2.72	5.002	3.734	-1.267
(3.0, 3.5)	11	3.23	3.605	4.657	1.052
(3.5, 4.0)	5	3.74	6.700	5.727	-.974

5 HIGHEST FLOODS

5	IRA101	4.31	7.113	7.190	.077
4	IRA103	4.56	9.609	7.912	-1.697
3	IRA101	4.89	10.436	8.967	-1.469
2	IRA113	5.41	12.724	10.871	-1.853
1	IRA102	6.41	13.262	15.582	2.320

Predictions for various return periods

.37	2	1.02
1.50	5	2.07
2.25	10	3.01
2.97	20	4.16
3.90	50	6.12
4.60	100	8.02
5.30	200	10.41
6.21	500	14.51
6.91	1000	18.54

 Combined Flood Frequency Analysis - World Flood Study 1983

ITALY STATIONS

	Catchment Name	No. of years
ITA101	BOITE AT VODO	20
ITA102	Bacchiglione at Montegaldelia	31
ITA103	adige at boara pisani	38
ITA104	adda at fuentes	34
ITA105	rutor at promise	20
ITA106	lys at gressoney st jean	16
ITA107	dora baltea at tavagnasco	32
ITA108	consaglia at presa centrale molline	25
ITA109	tanaro at montecastello	26
ITA110	po at ponte lagoscuro	42
ITA111	magna at calamazza	40
ITA112	sieve at fornacina	37
ITA113	arno at s.giovanni alla vena	45
ITA114	ombrone at sasso d ombrone	39
ITA115	tevere at roma	39
ITA116	pescara at s.teresa	39
ITA117	volturno at cancello arnone	21
ITA118	agri at tarangelo	31
ITA119	alli at orso	28
ITA120	oreto at parco	44
ITA121	simeto at giaretta	37
ITA122	fluminimaggiore at fluminimaggiore	16

22 Stations Total number of years 700

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 Km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
ITA101	20	77.1	323	?	1120	1030	2.35
ITA102	31	273	1380	?	1480	672	2.3
ITA103	38	999	12000	?	967	639	2.0
ITA104	34	640	2500	?	1110	1060	2.2
ITA105	20	15.7	49.8	?	1340	1680	2.3
ITA106	16	27.3	90.6	?	1190	1360	3.45
ITA107	32	782	3310	?	965	951	2.9
ITA108	25	35.3	885	?	1370	1070	3.0
ITA109	26	1910	7990	?	1030	528	2.05
ITA110	42	5415	70100	?	1110	668	2.1
ITA111	40	1549	939	?	1760	1360	2.4
ITA112	37	443	831	?	1220	596	3.1
ITA113	45	1430	8190	?	1040	381	1.9
ITA114	39	1063	2660	?	924	323	3.0
ITA115	39	1403	16600	?	1030	444	2.1
ITA116	39	264	3130	?	896	534	3.7
ITA117	21	1082	5560	?	1160	557	1.9
ITA118	31	186	507	?	1100	623	3.0
ITA119	28	12.2	46	?	1560	845	3.55
ITA120	44	93.1	75.5	?	1080	505	4.05
ITA121	37	1177	1830	?	747	309	2.3
ITA122	16	28.5	83	?	835	389	4.15

 General Extreme Value fit

Results of G.E.V. fitting to 700 station-years

Intercept U .814 Slope Alpha .354 Curvature K -.0546

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	45	-1.23	.417	.395	-.022
(-1.0, -.5)	87	-.72	.562	.563	.001
(-.5, 0.0)	123	-.25	.716	.728	.012
(0.0, .5)	126	.24	.897	.902	.005
(.5, 1.0)	101	.74	1.077	1.080	.003
(1.0, 1.5)	79	1.23	1.277	1.266	-.011
(1.5, 2.0)	48	1.72	1.455	1.454	-.000
(2.0, 2.5)	37	2.22	1.682	1.650	-.032
(2.5, 3.0)	20	2.72	1.842	1.852	.010
(3.0, 3.5)	14	3.24	2.119	2.068	-.052
(3.5, 4.0)	6	3.72	2.280	2.273	-.007
(4.0, 4.5)	14	4.20	2.349	2.485	.137

5 HIGHEST FLOODS

5	ITA112	5.03	3.025	2.863	-.162
4	ITA119	5.28	3.082	2.980	-.102
3	ITA120	5.61	3.255	3.138	-.117
2	ITA108	6.13	3.767	3.390	-.377
1	ITA120	7.13	3.781	3.899	.118

Predictions for various return periods

.37	2	.95
1.50	5	1.37
2.25	10	1.66
2.97	20	1.96
3.90	50	2.35
4.60	100	2.67
5.30	200	2.99
6.21	500	3.43
6.91	1000	3.78

 Combined Flood Frequency Analysis - World Flood Study 1983

Ivory Coast Stations

Catchment Name		No. of years
IV0101	cavally at tai	19
IV0102	N'ce at tai	19
IV0103	sassandra at soubre	20
IV0104	sassandra at guessabo	21
IV0105	sassandra at semien	20
IV0106	bandama at tiassale	17
IV0107	comoe at aniassue	21
IV0108	comoe at akakomoekro	17
IV0109	comoe at serebou	20
IV0110	Bandama at Kumukro	19

10 Stations

Total number of years 193

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
IVO101	19	773	13800	?	?	?	2.0
IVO102	19	131	1240	?	?	?	2.75
IVO103	20	1768	62000	?	?	?	1.6
IVO104	21	1404	35000	?	?	?	1.4
IVO105	20	1316	28800	?	?	?	1.6
IVO106	17	1839	94300	?	?	?	1.7
IVO107	19	1331	55000	?	?	?	2.0
IVO108	21	1421	66500	?	?	?	2.1
IVO109	17	1190	57000	?	?	?	2.0
IVO110	20	1347	49000	?	?	?	2.2

 General Extreme Value fit

Results of G.E.V. fitting to 193 station-years

Intercept U .861 Slope Alpha .396 Curvature K .3191

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	10	-1.21	.279	.275	-.003
(-1.0, -.5)	25	-.74	.510	.531	.020
(-.5, 0.0)	35	-.25	.769	.760	-.010
(0.0, .5)	33	.24	.960	.953	-.007
(.5, 1.0)	30	.73	1.135	1.120	-.015
(1.0, 1.5)	22	1.25	1.262	1.269	.007
(1.5, 2.0)	13	1.75	1.379	1.394	.014
(2.0, 2.5)	10	2.24	1.539	1.497	-.043
(2.5, 3.0)	5	2.57	1.426	1.556	.130
(3.0, 3.5)	2	3.41	1.666	1.685	.020
(3.5, 4.0)	8	3.57	1.658	1.705	.047

5 HIGHEST FLOODS

5	IV0110	3.73	1.759	1.726	-.033
4	IV0110	3.98	1.773	1.755	-.018
3	IV0107	4.32	1.780	1.790	.010
2	IV0102	4.84	1.978	1.838	-.140
1	IV0102	5.84	2.168	1.911	-.257

Predictions for various return periods

.37	2	1.00
1.50	5	1.33
2.25	10	1.50
2.97	20	1.62
3.90	50	1.75
4.60	100	1.82
5.30	200	1.87
6.21	500	1.93

 Combined Flood Frequency Analysis - World Flood Study 1983

JAPAN STATIONS

	Catchment Name	No. of years

JAP101	ishikari at ishikari-oohashi	19
JAP102	kitakami at kozenji	24
JAP103	mogami at shimono	47
JAP104	tone at yattajima	34
JAP105	fuji at shimizubata	51
JAP106	shinano at ojiya	22
JAP107	toyo at ishida	54
JAP108	nagara at chusetzu	46
JAP109	Yodo at Hirakata	7
JAP110	Kizu at kamo	7
JAP111	oota at kumura	21
JAP112	yoshino at iwatsu	12
JAP113	chikugo at senoshita	22
JAP114	tokachi at moiwa	18
JAP116	takara at takara-gawa	25
15 Stations		Total number of years 409

Station Number	No. Yrs.	MAF	Area	Slope	AAR	MAR	Q(100)
		3 -1 m s	2 km		mm	mm	----- MAF
JAP101	19	3422	12800	0.84	1330	1210	3.25
JAP102	24	2675	6990	0.22	1610	1300	3.65
JAP103	47	1698	3530	1.7	2240	1540	2.45
JAP104	34	3424	5110	1.61	1500	1180	5.64
JAP105	51	1444	2120	3.9	1130	900	5.58
JAP106	22	3343	9720	1.4	1500	1490	2.1
JAP107	54	1914	724	2.3	2360	729	2.5
JAP108	46	3660	1610	1.57	2530	2320	2.3
JAP109	7	5614	7280	0.15	1450	1310	?
JAP110	7	4031	1460	0.66	1360	1050	?
JAP111	21	2529	1690	1.4	2000	1570	3.7
JAP112	12	7124	2810	0.72	2020	1630	2.1
JAP113	22	2542	2300	1.7	2040	1450	2.75
JAP114	18	1658	8400	0.35	1020	850	4.05
JAP116	25	49.1	19.1	9.6	3070	3110	3.5

 General Extreme Value fit

Results of G.E.V. fitting to 409 station-years

Intercept U .775 Slope Alpha .396 Curvature K -.1527

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-2.0, -1.5)	2	-1.51	.154	.240	.086
(-1.5, -1.0)	21	-1.22	.378	.336	-.043
(-1.0, -.5)	52	-.75	.496	.496	.000
(-.5, 0.0)	73	-.25	.660	.677	.017
(0.0, .5)	74	.24	.863	.873	.010
(.5, 1.0)	59	.73	1.076	1.082	.006
(1.0, 1.5)	48	1.24	1.342	1.317	-.025
(1.5, 2.0)	28	1.74	1.608	1.566	-.041
(2.0, 2.5)	18	2.21	1.872	1.819	-.053
(2.5, 3.0)	15	2.67	2.058	2.084	.026
(3.0, 3.5)	7	3.28	2.509	2.462	-.047
(3.5, 4.0)	7	3.66	2.342	2.715	.372
(4.0, 4.5)	3	4.31	3.136	3.193	.057
(4.5, 5.0)	2	4.54	3.773	3.368	-.405

5 HIGHEST FLOODS

5	JAP105	4.49	3.358	3.332	-.026
4	JAP105	4.74	3.358	3.532	.174
3	JAP105	5.07	3.877	3.809	-.068
2	JAP104	5.59	4.936	4.273	-.663
1	JAP105	6.59	5.054	5.279	.225

Predictions for various return periods

.37	2	.92
1.50	5	1.44
2.25	10	1.84
2.97	20	2.26
3.90	50	2.89
4.60	100	3.42
5.30	200	4.01
6.21	500	4.88
6.91	1000	5.63

 Combined Flood Frequency Analysis - World Flood Study 1983

JAVA STATIONS

	Catchment Name	No. of years
JAV001	Citarum at Nanjung	21
JAV002	Citarum at Saguling	7
JAV003	Citarum at Palumbon	31
JAV004	Cianten II at Kracak	58
JAV005	Cikarang at Cikarang	11
JAV007	Cilamaya at Cipedeu	6
JAV008	Cigulung at Maribaya	22
JAV009	Cikapundung at Maribaya	12
JAV010	Cimanuk at Leuwigoon	32
JAV011	Cimanuk at Leuwidaun	10
JAV012	Cimanuk at Tomo	10
JAV013	Cimanuk at Parakan Kondang	19
JAV015	Cilangla at Leuwineuteuk	6
JAV016	Cisanggarung at Cilengkrang	5
JAV017	Citanduy at Cirahong	8
JAV018	Ciseel at Cilisung	8
JAV019	Ciseel at Binangun	7
JAV020	Cidurian at Kopomaja	8
JAV021	Cidurian at Parigi	9
JAV022	Ciujung at Krangilan	10
JAV023	Cikaduen at Cibogo	9
JAV024	Ciliman at Leuwikopo	6
JAV025	Ciletuh at Cipiring	5
JAV026	Cimandiri at Tegal Datar	6
JAV027	Kawah Ciwidey at Pos A	10
JAV028	Cipadarum at Pos B	12
JAV029	Ciwidey at Pos C	11
JAV030	Cisarua at Pos D	13
JAV031	Cisarua at Pos E	9
JAV032	Kali Padegolan at Pajengkolan	6
JAV033	Kali Serayu at Banyumas	11
JAV035	Kali Progo at Duwet	8
JAV036	Kali Progo at Kranggan II	9
JAV038	Kali Serang at Durungan	10
JAV039	Kali Bogowonto at Glagah Malang	8
JAV040	Kali Bogowonto at Bener	35
JAV041	Kali Lusi at Menduran	6
JAV042	Bengawan Solo at Napel	10
JAV043	Kali Serayu at Garung	48
JAV044	Bengawan Solo at Jurang Gempal	12

JAV045	Bengawan Solo at Kauman	10
JAV046	Bengawan Solo at Bojonegoro	11
JAV048	Kali Brantas at Mojekerto	10
JAV049	Kali Asem at Sentul	8
JAV050	Kali Welang at Porwodadi	12
JAV051	Kali Brantas at Kertosono	8
JAV052	Kali Brantas at Gadang	4

47 Stations Total number of years 607

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
JAV001	21	270.1	1832.6	1.35	2305	?	1.5
JAV002	7	659.6	2367	1.04	2256	?	?
JAV003	31	1447	4232	1.03	2479	?	2.05
JAV004	58	331.2	126.3	8.63	4950	?	2.1
JAV006	11	244.8	217.6	.543	3482	?	2.0
JAV007	6	497.2	139.2	5.03	3631	?	?
JAV008	22	26.70	49.20	9.91	2709	?	1.9
JAV009	12	31.10	75.60	8.56	2679	?	1.75
JAV010	32	294.9	757.4	2.08	2560	?	1.65
JAV011	10	102.7	474.9	3.13	2715	?	2.05
JAV012	10	609.8	1996	1.36	2631	?	1.6
JAV013	19	680.7	1514.8	1.49	2559	?	1.7
JAV015	6	460	179.9	2.18	3266	?	?
JAV016	5	391.8	622.1	1.09	2669	?	?
JAV017	8	588.2	634.7	1.85	3415	?	?
JAV018	8	143.4	178.5	3.66	3389	?	?
JAV019	7	250.2	320.3	1.96	3279	?	?
JAV020	8	302.9	300	2.69	3364	?	?
JAV021	9	193.2	622	2.01	2970	?	?
JAV022	10	733.1	1858	.694	3120	?	1.45
JAV023	9	142.6	34.6	11.3	3327	?	?
JAV024	6	121.5	108.5	2.37	3261	?	?
JAV025	5	294.5	79.3	2.44	4086	?	?
JAV026	6	369.4	495.1	2.16	2988	?	?
JAV027	10	0.579	10.43	20.0	3650	?	1.75
JAV028	12	6.57	3.05	15.0	3490	?	2.65
JAV029	11	7.67	10.81	13.8	3483	?	1.85
JAV030	13	5.11	4.72	15.0	3517	?	2.1
JAV031	9	5.12	2.43	18.8	3480	?	?
JAV032	6	627.8	212.4	2.59	4079	?	?
JAV033	11	1135	2642.4	1.92	4050	?	1.3
JAV035	8	519.4	1749.4	3.70	2985	?	?
JAV036	9	374.7	417.2	8.25	2270	?	?
JAV038	10	401.7	101.9	5.20	2295	?	2.3
JAV039	8	217	141.5	8.62	2423	?	?
JAV040	30	95.2	90	15.0	2034	?	1.95
JAV041	6	466.9	1968.1	.217	2034	?	?
JAV042	10	2150.	9578.0	.467	2245	?	1.60
JAV043	48	53.2	56.4	10.3	3424	?	3.95
JAV044	12	909.5	1442	1.70	2122	?	4.15
JAV045	10	1477	5900	.477	2342	?	1.65
JAV046	11	2072	12429	.272	2189	?	1.9
JAV048	10	1198	9972.9	.886	2176	?	1.5
JAV049	3	100.6	187.4	8.17	3250	?	?
JAV050	12	140.8	152	7.59	2469	?	2.6
JAV051	8	650	6902	1.11	2231	?	?
JAV052	4	217.7	772.2	4.92	1990	?	?

 General Extreme Value fit

Results of G.E.V. fitting to 607 station-years

Intercept U .848 Slope Alpha .239 Curvature K -.1259

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-2.0, -1.5)	1	-1.53	.522	.514	-.008
(-1.5, -1.0)	24	-1.15	.545	.591	.046
(-1.0, -.5)	85	-.75	.565	.676	.011
(-.5, 0.0)	111	-.23	.803	.793	-.010
(0.0, .5)	100	.24	.916	.906	-.010
(.5, 1.0)	92	.71	1.030	1.026	-.004
(1.0, 1.5)	73	1.22	1.169	1.164	-.005
(1.5, 2.0)	45	1.75	1.327	1.316	-.011
(2.0, 2.5)	24	2.22	1.466	1.461	-.005
(2.5, 3.0)	34	2.76	1.600	1.637	.037
(3.0, 3.5)	9	3.12	1.871	1.762	-.109
(3.5, 4.0)	4	3.61	1.542	1.941	.399
(4.0, 4.5)	4	4.16	2.253	2.155	-.098
(4.5, 5.0)	1	4.64	2.011	2.355	.344

5 HIGHEST FLOODS

5	JAV043	4.89	2.662	2.464	-.198
4	JAV043	5.14	2.662	2.576	-.086
3	JAV043	5.47	2.738	2.730	-.008
2	JAV023	5.98	2.819	2.984	.165
1	JAV043	6.99	3.822	3.527	-.295

Predictions for various return periods

.37	2	.94
1.50	5	1.24
2.25	10	1.47
2.97	20	1.71
3.90	50	2.05
4.60	100	2.34
5.30	200	2.65
6.21	500	3.10
6.91	1000	3.48

 Combined Flood Frequency Analysis - World Flood Study 1983

JORDAN STATIONS

Catchment Name		No. of years
JOR101	yarmouk at adasiya	12
JOR102	yarmouk at maqarin	10
JOR103	zerqa at deir alla	9
JOR104	Zerqa at Jerash Bridge	9
JOR105	w.wala at bridge	8
JOR106	w.mojib at kerak road bridge	9
6	Stations	Total number of years
		57

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
JOR101	12	285	6790	1.04	405	32.6	9.68
JOR102	10	172	5950	?	427	15.2	2.8
JOR103	9	130	3400	0.45	271	9.8	?
JOR104	9	107	3100	?	342	7.2	?
JOR105	8	119	1810	0.25	240	9.2	?
JOR106	9	290	4380	0.2	157	3.7	?

 General Extreme Value fit

Results of G.E.V. fitting to 57 station-years

Intercept U .715 Slope Alpha .942 Curvature K -.1823

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	1	-1.06	.035	-.190	-.225
(-1.0, -.5)	10	-.75	.294	.048	-.245
(-.5, 0.0)	9	-.23	.469	.505	.037
(0.0, .5)	10	.23	.836	.936	.101
(.5, 1.0)	8	.69	1.122	1.406	.284
(1.0, 1.5)	7	1.18	1.597	1.957	.361
(1.5, 2.0)	5	1.71	3.018	2.607	-.411
(2.0, 2.5)	1	2.02	2.279	3.013	.734
(2.5, 3.0)	5	2.77	4.324	4.112	-.212
(3.0, 3.5)		3.06	4.594	4.578	-.016

5 HIGHEST FLOODS

5	JOR103	2.49	4.022	3.678	-.344
4	JOR101	2.74	4.594	4.068	-.526
3	JOR106	3.08	5.483	4.611	-.872
2	JOR105	3.61	5.874	5.529	-.345
1	JOR106	4.62	6.518	7.544	1.026

Predictions for various return periods

.37	2	1.07
1.50	5	2.34
2.25	10	3.34
2.97	20	4.43
3.90	50	6.07
4.60	100	7.50
5.30	200	9.12

 Combined Flood Frequency Analysis - World Flood Study 1983

KOREAN STATIONS

Catchment Name		No. of years
KOR101	Han at Iwdogyo	49
KOR102	Han at Goan	36
KOR103	Han at Yo-Ju	21
KOR104	Han at Chungju	50
KOR105	Han at Yeogwol	30
KOR106	Han at Jeonsseon	5
KOR107	Geum at Gongju	43
KOR108	Geum at Song po	8
KOR109	Geum at Og Cheon	8
KOR110	Geum at Yong Dam	9
KOR111	Yeongsan at Naju	42
KOR112	Yeongsan at Mareug	11
KOR113	Nampyeong	10
KOR114	Soemjin at Song Jeong	40
KOR115	Soemjin at Abnog	38
KOR116	Nakdong at Jindong	27
KOR117	Nak Dong at Hyeon Pung	9
KOR118	Nak Dong at Waegwan	28
KOR119	Nak Dong at Andong	13
KOR120	Geum at Donchow	12
KOR121	Nam at Jeognam	6
KOR122	Hwang at Haplheon	7
KOR123	Hwang at Changri	6
23	Stations	Total number of years 508

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 Km	Slope -1 m. (Kmx10)	AAR mm	MAR mm	Q(100) ----- MAF
KOR101	49	13692	25050	.277	1165	?	2.62
KOR102	36	14298	23880	.246	1157	?	2.7
KOR103	21	5823	10320	.277	1176	?	2.68
KOR104	50	4863	6660	.319	1175	?	2.99
KOR105	30	2653	2430	.457	1256	?	4.85
KOR106	5	2173	1680	.648	1304	?	?
KOR107	42	4323	7130	.204	1165	?	2.42
KOR108	8	5408	3880	.255	1147	?	?
KOR109	8	2902	2940	.323	1155	?	?
KOR110	9	1476	937	.697	1217	?	?
KOR111	42	2245	2060	.487	1458	?	2.47
KOR112	11	590	684	.648	1453	?	2.04
KOR113	10	1955	582	.579	1498	?	2.88
KOR114	40	4944	4480	.308	1416	?	2.2
KOR115	38	3064	2450	.344	1349	?	1.85
KOR116	27	6410	20310	.260	1119	?	2.58
KOR117	9	4777	14000	.301	1021	?	?
KOR118	28	3754	11070	.345	1020	?	2.95
KOR119	13	1513	3590	.593	981	?	4.4
KOR120	12	2178	1540	.483	1011	?	2.73
KOR121	6	2375	2990	.607	1430	?	?
KOR122	7	1151	1120	1.04	1250	?	?
KOR123	6	1080	925	1.27	1250	?	?

 General Extreme Value fit

Results of G.E.V. fitting to 508 station-years

Intercept U .799 Slope Alpha .377 Curvature K -.0235

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-2.0, -1.5)	1	-1.50	.082	.242	.160
(-1.5, -1.0)	28	-1.21	.322	.349	.028
(-1.0, -.5)	66	-.73	.530	.525	-.005
(-.5, 0.0)	90	-.24	.722	.708	-.014
(0.0, .5)	90	.25	.899	.892	-.007
(.5, 1.0)	75	.74	1.072	1.079	.008
(1.0, 1.5)	56	1.23	1.242	1.270	.029
(1.5, 2.0)	37	1.73	1.472	1.464	-.008
(2.0, 2.5)	25	2.23	1.697	1.663	-.034
(2.5, 3.0)	20	2.76	1.873	1.875	.002
(3.0, 3.5)	9	3.26	2.034	2.080	.046
(3.5, 4.0)	4	3.85	2.665	2.318	-.346
(4.0, 4.5)	7	4.32	2.305	2.516	.211

5 HIGHEST FLOODS

5	KOR118	4.71	2.592	2.679	.087
4	KOR104	4.96	2.876	2.784	-.092
3	KOR119	5.29	3.114	2.925	-.189
2	KOR105	5.81	3.142	3.148	.006
1	KOR105	6.81	3.693	3.586	-.107

Predictions for various return periods

.37	2	.94
1.50	5	1.38
2.25	10	1.67
2.97	20	1.96
3.90	50	2.34
4.60	100	2.63
5.30	200	2.93
6.21	500	3.33
6.91	1000	3.63

Malaysia - additional notes

Large floods in 1967 affected several catchments with only a short record length. This may have artificially steepened the growth curve for Malaysia.

 Combined Flood Frequency Analysis - World Flood Study 1983

MALAYSIA STATIONS

Catchment Name		No.of years
MAL101	Kelantan at guillemard bridge	17
MAL102	tregganu at Kampong tanggol	17
MAL103	perak at iskandar bridge	18
MAL104	klang at Kuala Lumpur	12
4	Stations	Total number of years
		64

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
MAL101	17	3638	11900	0.26	2500	1360	3.25
MAL102	17	3317	3380	0.26	3300	1440	3.95
MAL103	18	1284	7770	0.29	2150	646	3.7
MAL104	12	156	457	0.93	2300	965	1.7

 General Extreme Value fit

Results of G.E.V. fitting to 64 station-years

Intercept U .801 Slope Alpha .375 Curvature K -.3637

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	4	-1.15	.574	.449	-.124
(-1.0, -.5)	7	-.73	.594	.560	-.033
(-.5, 0.0)	11	-.28	.739	.701	-.038
(0.0, .5)	12	.21	.892	.885	-.007
(.5, 1.0)	10	.73	1.079	1.113	.034
(1.0, 1.5)	8	1.27	1.259	1.409	.150
(1.5, 2.0)	4	1.79	1.517	1.745	.228
(2.0, 2.5)	4	2.30	2.084	2.154	.071
(2.5, 3.0)	0	0.00	0.000	0.000	0.000
(3.0, 3.5)	4	3.34	3.524	3.242	-.282

5 HIGHEST FLOODS

5	MAL101	2.61	1.979	2.432	.453
4	MAL102	2.86	3.166	2.691	-.475
3	MAL102	3.20	3.768	3.073	-.695
2	MAL101	3.73	4.068	3.772	-.296
1	MAL103	4.74	4.907	5.544	.637

Predictions for various return periods

.37	2	.95
1.50	5	1.55
2.25	10	2.11
2.97	20	2.81
3.90	50	4.03
4.60	100	5.27
5.30	200	6.85

 Combined Flood Frequency Analysis - World Flood Study 1983

Malawi Stations

	Catchment Name	No. of years
MAW101	Tuchila at 1635 A2	26
MAW102	KwaiKwasi at 1635 A2	23
MAW103	Rivi Rivi at 1534 B2	18
MAW104	Thondwe at 1535 A4	16
MAW105	Linthipe at 1334 C4	22
MAW106	Linthipe at 1434 A1	12
MAW107	Diamphwe at 1434 A1	20
MAW108	Lilongwe at 1333 D4	23
MAW109	Lingadzi at 1333 D4	24
MAW110	Lingadzi at 1334 C1	16
MAW111	Kaombe at 1234 C3	8
MAW112	Bua at 1234 C3	21
MAW113	Bua at 1333 B2	20
MAW114	Bua at 1333 B3	26
MAW115	Mtiti at 1333 D3	21
MAW116	Dwangwa at 1233 C4	19
MAW117	Dwambadzi at 1233 B2	10
MAW118	Mlowe at 1234 A1	7
MAW119	Limphasa at 1134 C2	10
MAW120	Luweya at 1134 C3	14
MAW121	Luchelemu at 1133 D2	20
MAW122	Luwawa at 1134	18
MAW123	South Rukuru at 1233 A2	18
MAW124	Lunyangwa at 1133 B4	24
MAW125	Kasitu at 1133 B2	23
MAW126	Chelinda at 1133 B2	17
MAW127	Runyina at 1033 D4	9
MAW128	North Rukuru @ 0993 D4 2 sites	24

28 Stations

Total number of years 509

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
MAW101	26	229.5	1400	?	1170	?	9.30
MAW102	23	35.3	63.5	?	1320	?	5.10
MAW103	18	240.7	748	?	970	?	4.55
MAW104	16	98.4	302	?	1070	?	11.30
MAW105	22	452.3	8180	?	940	?	2.34
MAW106	12	143.9	584	?	1020	?	6.00
MAW107	20	191.1	1460	?	990	?	3.20
MAW108	23	133.7	1870	?	1040	?	4.55
MAW109	24	68.04	928	?	940	?	2.20
MAW110	16	111.3	387	?	1070	?	9.30
MAW111	8	363.8	430	?	1220	?	5.60
MAW112	21	775	10600	?	970	?	3.06
MAW113	20	142	9410	?	890	?	2.98
MAW114	26	114	6790	?	890	?	4.70
MAW115	21	26.7	233	?	860	?	26.30
MAW116	19	77.5	2980	?	860	?	2.15
MAW117	10	106.6	778	?	1400	?	2.46
MAW118	7	55.1	113	?	1680	?	?
MAW119	10	31.8	261	?	1680	?	1.20
MAW120	14	311.7	2420	?	1630	?	3.38
MAW121	20	14.2	297	?	1470	?	1.90
MAW122	18	20.9	114	?	1650	?	4.15
MAW123	18	27.1	958	?	970	?	4.50
MAW124	24	89.9	513	?	1400	?	12.00
MAW125	23	76.4	2280	?	1090	?	2.37
MAW126	17	22.7	746	?	1140	?	4.50
MAW127	9	24.5	602	?	1090	?	1.64
MAW128	24	256.5	1760	?	1190	?	4.49

 General Extreme Value fit

Results of G.E.V. fitting to 509 station-years

Intercept U .775 Slope Alpha .444 Curvature K -.3754

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	25	-1.20	.265	.345	.079
(-1.0, -.5)	67	-.75	.423	.485	.061
(-.5, 0.0)	90	-.25	.632	.668	.036
(0.0, .5)	92	.24	.859	.886	.027
(.5, 1.0)	77	.74	1.169	1.153	-.016
(1.0, 1.5)	55	1.24	1.583	1.474	-.109
(1.5, 2.0)	38	1.73	2.055	1.855	-.200
(2.0, 2.5)	23	2.22	2.624	2.315	-.309
(2.5, 3.0)	19	2.69	2.652	2.839	.187
(3.0, 3.5)	8	3.35	3.461	3.752	.291
(3.5, 4.0)	15	3.68	4.222	4.306	.083

5 HIGHEST FLOODS

5 MAW101	4.71	5.673	6.529	.856
4 MAW104	4.96	5.943	7.207	1.264
3 MAW115	5.29	6.019	8.217	2.198
2 MAW124	5.81	9.457	10.066	.609
1 MAW115	6.81	16.822	14.843	-1.979

Predictions for various return periods

.37	2	.95
1.50	5	1.67
2.25	10	2.35
2.97	20	3.20
3.90	50	4.71
4.60	100	6.25
5.30	200	8.23
6.21	500	11.79
6.91	1000	15.42

 Combined Flood Frequency Analysis - World Flood Study 1983

MOROCCAN STATIONS

Catchment Name		No. of years
MOR101	ouergha at mjara	41
MOR102	sebou at azib soltane	40
MOR103	loukkos at m'nissa	12
3	Stations	Total number of years
		93

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
MOR101	41	2642	6190	0.8	1260	560	3.4
MOR102	40	693	16400	0.5	720	144	9.55
MOR103	12	1090	2120	0.01	1130	510	2.2

 General Extreme Value fit

Results of G.E.V. fitting to 93 station-years

Intercept U .779 Slope Alpha .536 Curvature K -.2559

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	7	-1.19	.368	.227	-.141
(-1.0, -.5)	11	-.69	.481	.438	-.044
(-.5, 0.0)	16	-.24	.632	.654	.023
(0.0, .5)	16	.24	.916	.909	-.007
(.5, 1.0)	14	.72	1.148	1.203	.055
(1.0, 1.5)	11	1.24	1.391	1.562	.171
(1.5, 2.0)	6	1.74	1.804	1.956	.152
(2.0, 2.5)	5	2.21	2.550	2.371	-.179
(2.5, 3.0)	2	2.73	3.576	2.897	-.679
(3.0, 3.5)	3	3.20	3.357	3.431	.073
(3.5, 4.0)	0	0.00	0.000	0.000	0.000
(4.0, 4.5)	2	4.28	4.475	4.942	.467

5 HIGHEST FLOODS

5	MOR102	2.99	3.266	3.187	-.080
4	MOR102	3.24	3.266	3.488	.221
3	MOR102	3.58	4.572	3.918	-.654
2	MOR102	4.10	5.899	4.670	-1.229
1	MOR102	5.11	5.942	6.425	.483

Predictions for various return periods

.37	2	.98
1.50	5	1.76
2.25	10	2.41
2.97	20	3.16
3.90	50	4.37
4.60	100	5.48
5.30	200	6.80

 Combined Flood Frequency Analysis - World Flood Study 1983

NIGERIAN STATIONS

Catchment Name		No. of years
NIG101	Bagel at Dass road	7
NIG102	Hawal at Garkida	17
NIG103	Gongola at Dindima	9
NIG104	Gongola at Dadin Kowa	21
NIG105	Gongola at Bare	13
NIG106	Jamaare at Bunga	13
NIG107	Misau at Kari	13
7	Stations	Total number of years 93

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
NIG101	7	401	1560	?	1196	321	?
NIG102	17	160	7460	?	910	106	4.4
NIG103	9	671	9600	?	1095	207	?
NIG104	21	958	32700	?	964	92	1.62
NIG105	13	1383	54000	?	1000	114	1.6
NIG106	13	1280	7980	?	1188	260	2.6
NIG107	13	369	5570	?	1045	105	3.28

 General Extreme Value fit

Results of G.E.V. fitting to 93 station-years

Intercept U .846 Slope Alpha .373 Curvature K -.0113

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	5	-1.13	.418	.427	.009
(-1.0, -.5)	11	-.74	.603	.571	-.032
(-.5, 0.0)	18	-.24	.734	.755	.022
(0.0, .5)	16	.25	.898	.940	.043
(.5, 1.0)	14	.74	1.140	1.123	-.017
(1.0, 1.5)	10	1.24	1.376	1.313	-.063
(1.5, 2.0)	6	1.66	1.575	1.470	-.105
(2.0, 2.5)	5	2.15	1.725	1.657	-.067
(2.5, 3.0)	3	2.63	1.416	1.841	.425
(3.0, 3.5)	4	3.21	2.122	2.064	-.059
(3.5, 4.0)	1	3.62	1.500	2.223	.723

5 HIGHEST FLOODS

5	NIG106	2.99	2.033	1.980	-.053
4	NIG107	3.24	2.181	2.077	-.104
3	NIG102	3.58	2.492	2.207	-.285
2	NIG102	4.10	2.492	2.411	-.081
1	NIG102	5.11	2.991	2.806	-.185

Predictions for various return periods

.37	2	.98
1.50	5	1.41
2.25	10	1.70
2.97	20	1.97
3.90	50	2.33
4.60	100	2.61
5.30	200	2.88

 Combined Flood Frequency Analysis - World Flood Study 1983

POLAND STATIONS

	Catchment Name	No. of years

POL101	liwiec at loahow	20
POL102	prosna at boguslaw	20
POL103	dunajec at nowy sacz	50
POL104	wieprz at lubartow	20
POL105	vistula at tyniec	20
POL106	san at radomysl	49
POL107	warta at poznan	20
POL108	Bug at Wyskow	50
POL109	oder at gozdowice	45
POL110	vistula at tczew	50
POL111	Pillica at Vistula	20

11 Stations Total number of years 364

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 Km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
POL101	20	117	2460	0.06	553	131	2.9
POL102	20	80.7	4300	0.10	543	107	3.4
POL103	50	749	4340	0.87	874	446	5.54
POL104	20	71.7	6360	0.06	585	108	11.24
POL105	20	686	7530	0.54	884	371	4.3
POL106	49	1471	16800	0.16	721	251	2.4
POL107	20	340	39100	0.06	561	109	2.6
POL108	50	681	39100	0.03	556	110	2.4
POL109	45	1402	110000	0.09	597	146	3.85
POL110	50	4144	194000	0.11	611	162	2.4
POL111	20	280	9670	0.09	625	167	2.2

 General Extreme Value fit

Results of G.E.V. fitting to 364 station-years

Intercept U .783 Slope Alpha .390 Curvature K -.1845

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-2.0, -1.5)	3	-1.50	.286	.271	-.015
(-1.5, -1.0)	18	-1.22	.371	.358	-.013
(-1.0, -.5)	51	-.72	.492	.520	.028
(-.5, 0.0)	59	-.24	.681	.692	.011
(0.0, .5)	68	.24	.871	.880	.008
(.5, 1.0)	55	.75	1.131	1.099	-.032
(1.0, 1.5)	37	1.25	1.355	1.330	-.025
(1.5, 2.0)	25	1.72	1.577	1.572	-.005
(2.0, 2.5)	17	2.17	1.843	1.821	-.023
(2.5, 3.0)	15	2.69	2.174	2.139	-.034
(3.0, 3.5)	5	3.45	2.490	2.667	.177
(3.5, 4.0)	6	3.57	3.116	2.756	-.361
(4.0, 4.5)	5	4.46	2.766	3.486	.719

5 HIGHEST FLOODS

5	POL105	4.37	3.290	3.406	.116
4	POL104	4.62	3.487	3.629	.142
3	POL103	4.95	4.406	3.942	-.464
2	POL103	5.47	4.406	4.472	.066
1	POL104	6.47	6.486	5.649	-.837

Predictions for various return periods

.37	2	.93
1.50	5	1.46
2.25	10	1.87
2.97	20	2.33
3.90	50	3.01
4.60	100	3.61
5.30	200	4.29
6.21	500	5.32
6.91	1000	6.23

 Combined Flood Frequency Analysis - World Flood Study 1983

ROMANIA STATIONS

	Catchment Name	No. of years

ROM101	iris at cocargea	11
ROM102	laslea at laslea	9
ROM103	jiul de vest	16
ROM104	tirnava mare at odorhei	17
ROM105	buzau at nehoiu	24
ROM106	tirnava mare at topa	18
ROM107	mures at tg.mures	23
ROM108	ialomita at cosereni	23
ROM109	jiu at podari	23
ROM110	arges at budesti	23
ROM111	somes at satu-mare	40
ROM112	mures at arad	40
ROM113	siret at lungoci	22
ROM114	Danube at Orsova	131

14 Stations

Total number of years 420

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 Km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
ROM101	11	8.7	10.5	1.04	400	20	20.4
ROM102	9	5.7	83	1.4	650	150	?
ROM103	16	53.0	140	5.55	1080	770	6.78
ROM104	17	62.9	657	2.06	816	262	7.60
ROM105	24	271	1570	2.01	840	386	7.12
ROM106	18	147	1670	1.1	730	162	7.78
ROM107	23	332	4050	0.29	810	261	4.7
ROM108	23	406	6470	1.12	710	176	3.2
ROM109	23	873	9240	0.63	790	296	2.65
ROM110	23	507	9370	0.66	671	168	3.7
ROM111	40	856	15200	0.44	770	237	4.35
ROM112	40	800	27600	0.11	730	175	3.6
ROM113	22	911	36500	0.19	660	135	5.62
ROM114	131	10092	575000	?	881	350	1.6

 General Extreme Value fit

Results of G.E.V. fitting to 420 station-years

Intercept U .837 Slope Alpha .328 Curvature K -.3380

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-2.0, -1.5)	1	-1.70	.515	.413	-.102
(-1.5, -1.0)	24	-1.21	.486	.511	.025
(-1.0, -.5)	53	-.74	.597	.623	.026
(-.5, 0.0)	74	-.25	.730	.758	.028
(0.0, .5)	75	.24	.893	.919	.026
(.5, 1.0)	65	.74	1.122	1.115	-.007
(1.0, 1.5)	43	1.24	1.372	1.344	-.028
(1.5, 2.0)	32	1.72	1.722	1.606	-.116
(2.0, 2.5)	20	2.24	1.842	1.934	.092
(2.5, 3.0)	14	2.74	2.862	2.321	-.541
(3.0, 3.5)	7	3.32	3.249	2.846	-.402
(3.5, 4.0)	8	3.72	2.903	3.287	.384
(4.0, 4.5)	3	4.33	2.779	4.061	1.282
(4.5, 5.0)	0	0.00	0.000	0.000	0.000
(5.0, 5.5)	1	5.45	1.575	6.002	4.427

5 HIGHEST FLOODS

5	ROM106	4.52	4.758	4.340	-.418
4	ROM104	4.77	4.848	4.734	-.114
3	ROM105	5.10	4.866	5.309	.443
2	ROM101	5.62	7.327	6.358	-.969
1	ROM101	6.62	11.250	8.964	-2.286

Predictions for various return periods

.37	2	.97
1.50	5	1.48
2.25	10	1.94
2.97	20	2.52
3.90	50	3.50
4.60	100	4.47
5.30	200	5.69
6.21	500	7.81
6.91	1000	9.91

Combined Flood Frequency Analysis - World Flood Study 1983

SUDAN (BLUE NILE) STATIONS

	Catchment Name	No. of years
-----		-----
SUD101	Atbara at mouth	64
SUD102	Rahad at mouth	44
SUD103	Dinder at mouth	45
SUD104	Blue Nile at Roseires	62
4	Stations	Total number of years 215

Station Number	No. Yrs.	MAF 3 - 1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
SUD101	64	2337	140000	?	?	?	2.0
SUD102	44	167	36000	?	?	?	1.67
SUD103	45	544	35000	?	?	?	1.62
SUD104	62	6527	210000	?	?	?	1.57

 General Extreme Value fit

Results of G.E.V. fitting to 215 station-years

Intercept U .901 Slope Alpha .205 Curvature K .0963

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-2.0, -1.5)	2	-1.55	.455	.557	.103
(-1.5, -1.0)	12	-1.21	.609	.637	.028
(-1.0, -.5)	27	-.73	.752	.746	-.006
(-.5, 0.0)	39	-.24	.867	.851	-.015
(0.0, .5)	38	.26	.964	.953	-.012
(.5, 1.0)	30	.74	1.041	1.047	.006
(1.0, 1.5)	24	1.22	1.137	1.138	.001
(1.5, 2.0)	15	1.71	1.206	1.225	.019
(2.0, 2.5)	12	2.23	1.305	1.313	.008
(2.5, 3.0)	6	2.76	1.360	1.398	.037
(3.0, 3.5)	4	3.27	1.471	1.477	.006
(3.5, 4.0)	2	3.71	1.566	1.542	-.024
(4.0, 4.5)	2	4.37	1.561	1.633	.073
(4.5, 5.0)	2	4.72	1.740	1.679	-.060

5 HIGHEST FLOODS

5	SUD104	3.84	1.568	1.560	-.008
4	SUD103	4.09	1.597	1.595	-.002
3	SUD101	4.43	1.699	1.641	-.058
2	SUD101	4.95	1.739	1.709	-.030
1	SUD101	5.95	1.911	1.830	-.081

Predictions for various return periods

.37	2	.97
1.50	5	1.19
2.25	10	1.32
2.97	20	1.43
3.90	50	1.57
4.60	100	1.66
5.30	200	1.75
6.21	500	1.86

 Combined Flood Frequency Analysis - World Flood Study 1983

Stations in Sumatra

	Catchment Name	No. of years
SUM103	S.Tamiang at Kuala Simpang	6
SUM105	Krueng Aceh at Kampung Darang	4
SUM117	Krueng Jambo Aye at Rampah	4
SUM118	Krueng Jambo Aye at Lhoknibong	8
SUM122	Krueng Lambeso at Sango	4
SUM201	Sei.Wampu at Stabat	10
SUM202	S. Belawen at Asam Kumbang	8
SUM205	S. Ular at Pulo Tagor	10
SUM206	S.Padang at Tebing Tinggi	5
SUM207	Bah Bolon at Batu Cajah	8
SUM208	Bah Bolon at Nagori Bandar	10
SUM209	S.Silau at Kisaran Naga	9
SUM216	Bt.Pane at Gunung Tua	6
SUM218	Batang Cadis at Perbangunan	9
SUM219	Batang Angkola at Air Libung	8
SUM243	Bt.Ilung at Kp.Hajoran	6
SUM246	Aek Puli at Sukamaju	4
SUM313	Bt. Bayang at Maura Air	15
SUM314	Batang Kurangi at Gunung Nago	8
SUM316	Bt. Anai at Kandang Empat	9
SUM331	Bt. Masang at Sipisang	11
SUM341	Bt. Tongar at Lubuk Toreh	9
SUM342	Bt. Pasaman at Air Cadang	6
SUM343	Bt. Batahan at Silaping	12
SUM413	S. Rokan Kiri at Lubuk Bendahara	5
SUM422	Bt. Mahat at Sipapay	7
SUM431	Bt. Agam at Titi	16
SUM511	Bt. Hari at Sungai Dareh	6
SUM512	Bt. Ule at Lubuk Tapus	6
SUM515	Bt. Tabir at Muara Jernih	8
SUM521	Batang Merangin at Lubuk Paku	15
SUM522	Bt. Tembesi at Muara Inum	12
SUM701	S.Musi at Despetah	8
SUM707	Air Komering at Martapura	9
SUM709	Air Ogan at Batu Raja	10
SUM711	Air Ogan at Tanjung Raya	7
SUM712	S. Rambang at Tanjung Rambang	9
SUM801	W. Sekampung at Kunjir	9
SUM803	W. Sekampung at Pujorahayu	12
SUM807	W. Bulok at Jembatan	6
SUM812	W.Sekampung at Angoguruh (Tegineneng)	14
SUM817	W. Besai at Petai	8
SUM818	W. Besai at Banjarmasin	9
SUM823	W. Giham at Rantau Jangkung	9
SUM824	W. Umpu at Negeri Batin	9

SUM825	SUM825	W. Pengubuan at Gedong Harta	6
SUM827		W. Terusan at Gunung Batin	8
SUM834		W. Rarem at Kota Bumi	6
SUM839		W. Umpu at Rantau Temiang	6

'49	Stations	Total number of years	409
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Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
SUM103	6	1015	4494.3	1.73	2700	?	?
SUM105	4	460	1085.6	2.08	1850	?	?
SUM117	4	815	4060.7	1.03	2500	?	?
SUM118	8	931.6	4402.7	.835	2450	?	?
SUM201	10	664.6	3788.9	1.08	2770	1600	1.3
SUM202	8	209	215	5.80	2600	?	?
SUM205	10	350	979	1.87	2650	1560	2.2
SUM206	5	155	917.6	1.31	2750	1700	?
SUM207	8	138	587.6	1.82	2780	?	?
SUM208	10	210.8	679.5	1.36	2770	1450	1.9
SUM209	9	257.7	1022.5	2.00	2710	2130	?
SUM216	6	873.5	836.9	1.90	2120	?	?
SUM218	9	306	820	2.84	2290	970	?
SUM219	8	202.3	629.7	2.43	2970	920	?
SUM243	6	182.4	180.8	4.02	1950	1190	?
SUM246	4	386.9	727.7	2.56	2040	1300	?
SUM313	15	165	209.3	6.86	3040	?	1.95
SUM314	8	415	121.6	7.03	3860	?	?
SUM316	9	89.1	110	10.6	3450	?	?
SUM331	11	180	436.9	5.76	2850	?	1.95
SUM341	9	263	304.9	3.04	4050	?	?
SUM342	6	981	1267	1.96	3440	?	?
SUM343	12	360	304	2.99	3100	?	2.2
SUM413	5	946	3128.7	.745	2580	?	?
SUM422	7	898	906.1	3.50	2790	?	?
SUM431	16	96	346.4	4.99	2340	?	2.05
SUM511	6	2941	4578.6	1.21	3290	?	?
SUM512	6	351	343.7	2.34	3220	?	?
SUM515	8	504.3	923	1.98	3140	?	?
SUM521	15	148	1256	3.42	2400	?	1.45
SUM522	12	1164	1505.3	2.69	3220	?	1.95
SUM701	8	217.4	649.7	2.63	3210	?	?
SUM707	9	1302	4463.6	.891	2730	?	?
SUM709	10	1409	2046	1.82	2920	?	2.05
SUM712	9	109.5	567	.163	2900	?	?
SUM801	9	323.4	432.1	2.33	2450	?	?
SUM803	12	463.4	1697.9	1.43	2440	?	2.2
SUM807	6	226.2	786	3.84	2450	?	?
SUM812	14	458.8	2102	1.09	2400	?	1.4
SUM817	8	84.2	416	.556	2460	?	?
SUM818	9	294.2	661.6	.928	2430	?	?
SUM823	9	279.6	526.7	2.02	2490	?	?
SUM824	9	313.2	555.6	2.26	2430	?	?
SUM825	6	67.5	111.3	3.91	2420	?	?
SUM827	8	108	528.5	.097	2375	?	?
SUM834	6	278.5	903	2.91	2420	?	?
SUM839	6	88.1	205.2	4.83	2450	?	?

 General Extreme Value fit

Results of G.E.V. fitting to 409 station-years

Intercept U .850 Slope Alpha .202 Curvature K -.2891

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	8	-1.09	.544	.661	.117
(-1.0, -.5)	67	-.75	.689	.714	.025
(-.5, 0.0)	67	-.24	.809	.804	-.005
(0.0, .5)	73	.23	.929	.897	-.032
(.5, 1.0)	59	.70	1.033	1.007	-.026
(1.0, 1.5)	51	1.20	1.137	1.138	.002
(1.5, 2.0)	32	1.73	1.317	1.303	-.014
(2.0, 2.5)	19	2.27	1.416	1.497	.081
(2.5, 3.0)	26	2.74	1.684	1.692	.008
(3.0, 3.5)	-	3.19	1.884	1.907	.023

5 HIGHEST FLOODS

5	SUM839	4.49	2.105	2.709	.604
4	SUM818	4.74	2.109	2.900	.791
3	SUM316	5.07	4.107	3.175	-.932
2	SUM818	5.59	4.434	3.664	-.770
1	SUM431	6.59	4.555	4.843	.288

Predictions for various return periods

.37	2	.93
1.50	5	1.23
2.25	10	1.49
2.97	20	1.80
3.90	50	2.31
4.60	100	2.79
5.30	200	3.38
6.21	500	4.36
6.91	1000	5.30

 Combined Flood Frequency Analysis World Flood Study 1983

SRI LANKA STATIONS

	Catchment Name	No. of years
SRI101	kelani at glencourse	24
SRI102	walawe ganga at embilipitiya	22
SRI103	Malwathu at Kapachchi	27
SRI104	Mahawelli Ganga at Manampitiya	24
SRI105	Mahawelli Ganga at Peradeniya	33
SRI106	Mahawelli Ganga at Gurudeniya	33
SRI107	Mahawelli Ganga at Randenigala	23
SRI108	Huluganga at Teldeniya	23
SRI109	Gamaloya at Moragamula	14
SRI110	Uma Oya at Talawakanda	19
SRI111	Maha Oya at Hanguranketa	5
SRI112	Callodai Aru	27
SRI113	Maduru Oya at Kadengama	6
13	Stations	Total number of years 280

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
SRI101	24	1459	2310	1.85	4050	3360	3.3
SRI102	22	741	2490	1.32	2140	863	3.52
SRI103	27	303	3300	1.4	1490	252	?
SRI104	24	2343	7340	0.7	2504	975	4.8
SRI105	33	1077	1189	?	3118	1784	3.97
SRI106	33	1413	1417	?	2934	1695	2.84
SRI107	23	913	2370	?	2713	1697	2.08
SRI108	23	189	161	?	3273	967	4.98
SRI109	14	147	73	?	2731	1182	2.46
SRI110	19	295	505	?	2064	669	7.24
SRI111	5	227	105	?	2553	646	?
SRI112	27	116	223	?	2144	671	2.7
SRI113	6	356	453	?	2173	604	?

 General Extreme Value fit

Results of G.E.V. fitting to 280 station-years

Intercept U .823 Slope Alpha .347 Curvature K -.5580

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	15	-1.22	.361	.517	.156
(-1.0, -.5)	35	-.75	.538	.611	.072
(-.5, 0.0)	52	-.25	.696	.742	.046
(0.0, .5)	50	.25	.896	.918	.022
(.5, 1.0)	43	.76	1.209	1.150	-.059
(1.0, 1.5)	28	1.25	1.691	1.448	-.242
(1.5, 2.0)	22	1.74	1.967	1.842	-.124
(2.0, 2.5)	13	2.24	2.246	2.377	.132
(2.5, 3.0)	9	2.70	3.050	3.007	-.043
(3.0, 3.5)	3	3.11	1.942	3.733	1.791
(3.5, 4.0)	8	3.73	6.416	5.202	-1.214
(4.0, 4.5)	2	4.07	4.819	6.247	1.428

5 HIGHEST FLOODS

5	SRI110	4.11	5.749	6.369	.620
4	SRI103	4.36	5.977	7.291	1.314
3	SRI104	4.69	8.043	8.731	.688
2	SRI103	5.21	9.016	11.599	2.583
1	SRI103	6.21	21.499	20.133	-1.366

Predictions for various return periods

.37	2	.96
1.50	5	1.64
2.25	10	2.39
2.97	20	3.47
3.90	50	5.69
4.60	100	8.31
5.30	200	12.16
6.21	500	20.17

 Combined Flood Frequency Analysis - World Flood Study 1983

SWEDEN STATIONS

	Catchment Name	No. of years
SWE101	Velenan at 67-1662Velen2	35
SWE102	Vesanan at K86/87-736 Halaback	30
SWE103	tannan at 48-1083lillglan	40
SWE104	esmaan at 100-1207gardsilt	45
SWE105	dummean at 67-818risbro	26
SWE106	ranealv at 7-20niemisel	66
SWE107	baljanea at 96-1635klippan2	50
SWE108	vattholmaan at 61-563vattholma	56
SWE109	arealven at 40-1328o.norn	72
SWE110	Giman at 42-97Gimdalsby	58
SWE111	motala strom at 67-154motala	71
SWE112	vindelalven at 28-56sorsole	63
SWE113	tornealv at 1-3jukkasjarvi	53
SWE114	ljusnan at 48-106sveg	48
SWE115	kilaralven at 108-1703Edsforsens Krv	43
SWE116	gotaalv at 108-243 sjotorp	131
SWE117	muonioalv at 1-589 kallio	61
SWE118	dalalven at 53-121 norslund	67
SWE119	Vindelalven at 28-1545 Renfors	62
SWE120	Motala strom at 67-172 Norsholm	50

20 Stations Total number of years 1127

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
SWE101	35	1.32	45	0.023	650	255	2.55
SWE102	30	0.3	4.7	0.041	600	215	2.8
SWE103	40	17.2	63	0.111	800	630	2.4
SWE104	45	8.35	55	0.021	1000	735	2.15
SWE105	26	5.2	50	0.025	650	385	3.75
SWE106	66	398	3770	0.026	540	330	2.05
SWE107	50	21.5	239	0.037	790	435	2.15
SWE108	56	8.8	284	0.014	570	240	3.0
SWE109	72	335	2390	0.056	935	835	2.05
SWE110	58	60.1	2180	0.017	575	255	2.4
SWE111	71	65.3	6360	0.017	600	210	1.8
SWE112	63	807	6110	0.035	755	630	1.75
SWE113	53	422	6000	0.055	535	535	1.8
SWE114	48	722	8490	0.040	655	450	1.8
SWE115	43	588	8580	0.025	700	470	2.25
SWE116	131	620	46800	0.017	690	363	1.3
SWE117	61	1058	14300	0.024	500	350	1.65
SWE118	67	1064	25300	0.022	675	435	2.4
SWE119	62	911	11900	0.019	750	550	1.9
SWE120	50	141	13200	0.015	580	205	1.6

 General Extreme Value fit

Results of G.E.V. fitting to 1127 station-years

Intercept U .854 Slope Alpha .250 Curvature K -.0299

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-2.0, -1.5)	13	-1.56	.470	.474	.003
(-1.5, -1.0)	61	-1.19	.554	.561	.007
(-1.0, -.5)	145	-.72	.671	.676	.004
(-.5, 0.0)	194	-.24	.786	.794	.008
(0.0, .5)	201	.24	.926	.915	-.011
(.5, 1.0)	168	.74	1.054	1.041	-.013
(1.0, 1.5)	120	1.24	1.170	1.169	-.001
(1.5, 2.0)	84	1.74	1.296	1.299	.003
(2.0, 2.5)	53	2.24	1.417	1.432	.014
(2.5, 3.0)	36	2.74	1.533	1.569	.036
(3.0, 3.5)	19	3.25	1.701	1.707	.006
(3.5, 4.0)	14	3.74	1.915	1.844	-.071
(4.0, 4.5)	8	4.37	1.919	2.022	.104
(4.5, 5.0)	10	4.71	2.106	2.119	.013
(5.0, 5.5)	1	5.45	1.347	2.334	.987

5 HIGHEST FLOODS

5	SWE108	5.51	2.735	2.351	-.384
4	SWE108	5.76	2.849	2.424	-.425
3	SWE105	6.09	2.861	2.523	-.338
2	SWE111	6.60	2.896	2.679	-.217
1	SWE102	7.60	2.991	2.988	-.003

Predictions for various return periods

.37	2	.95
1.50	5	1.24
2.25	10	1.44
2.97	20	1.63
3.90	50	1.89
4.60	100	2.09
5.30	200	2.29
6.21	500	2.56
6.91	1000	2.77

 Combined Flood Frequency Analysis - World Flood Study 1983

TOGO & BENIN STATIONS

Catchment Name	No. of years
TOG101 Oti at Mango	27
TOG102 Oti at Mandouri	20
TOG103 Pendjari at Ponga	21
TOG104 Kara at Lama Kara	26
TOG105 Kara at Kpesside	17
TOG106 Keran at Naboulgou	18
TOG107 Keran at Titira	18
TOG108 Sota at Kouberi	26
TOG109 Alibiri at Route Kandi-Banikoara	26
TOG110 Mono at Tetetou	28
TOG111 Mono at Dotalikope	20
TOG112 Mono at Correkope	26
TOG113 Ogou at Sirka	23
TOG114 Anie at Pont CFT	16
TOG115 Oueme at Pont de Beterou	23
TOG116 Oueme at Pont de Save	28
TOG117 Zou at Pont d'Atcherigbe	25
TOG118 Okpara at Kaboua	27
TOG119 Okpara at Nanon	18

19 Stations Total number of years 433

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
TOC101	27	907	35650	?	1000	?	2.44
TOC102	21	570	29100	?	980	?	1.53
TOC103	21	422	22280	?	970	?	1.62
TOC104	26	420	1560	?	1470	?	1.78
TOC105	17	642	2790	?	1450	?	2.46
TOC106	18	589	5470	?	1300	?	1.76
TOC107	18	669	3695	?	1350	?	1.77
TOC108	26	251	13410	?	1120	?	2.12
TOC109	26	382	8150	?	1150	?	1.96
TOC110	28	788	20100	?	1250	?	2.22
TOC111	20	515	5589	?	1250	?	1.86
TOC112	26	524	9952	?	1240	?	1.78
TOC113	23	81	4035	?	1180	?	2.5
TOC114	16	390	3630	?	1320	?	3.76
TOC115	23	492	10326	?	1250	?	1.64
TOC116	28	932	23600	?	1200	?	2.5
TOC117	25	353	6950	?	1170	?	2.32
TOC118	27	254	9600	?	1180	?	2.5
TOC119	18	101	2067	?	1190	?	2.08

 General Extreme Value fit

Results of G.E.V. fitting to 433 station-years

Intercept U .832 Slope Alpha .424 Curvature K .2238

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-1.5, -1.0)	27	-1.19	.256	.256	-.000
(-1.0, -.5)	53	-.72	.510	.500	-.010
(-.5, 0.0)	73	-.26	.714	.720	.006
(0.0, .5)	82	.24	.910	.930	.020
(.5, 1.0)	63	.74	1.125	1.122	-.003
(1.0, 1.5)	48	1.24	1.328	1.291	-.037
(1.5, 2.0)	33	1.75	1.469	1.445	-.023
(2.0, 2.5)	21	2.25	1.586	1.584	-.002
(2.5, 3.0)	14	2.76	1.659	1.705	.046
(3.0, 3.5)	5	3.43	1.890	1.849	-.041
(3.5, 4.0)	14	3.78	1.827	1.914	.088

5 HIGHEST FLOODS

5	TOG117	4.55	2.056	2.043	-.013
4	TOG113	4.80	2.079	2.080	.001
3	TOG118	5.13	2.107	2.127	.020
2	TOG116	5.65	2.108	2.193	.085
1	TOG114	6.65	2.805	2.300	-.505

Predictions for various return periods

.37	2	.98
1.50	5	1.37
2.25	10	1.58
2.97	20	1.75
3.90	50	1.94
4.60	100	2.05
5.30	200	2.15
6.21	500	2.26
6.91	1000	2.32

 Combined Flood Frequency Analysis - World Flood Study 1983

UNITED KINGDOM STATIONS

	Catchment Name	No. of years
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UNI101	Burbage Brook at Burbage	45
UNI102	Wye at Cefn Brwyn	22
UNI103	Canons Brook at Harlow	19
UNI104	Irvine at Kilmarnock	53
UNI105	Don at Doncaster	84
UNI106	Spey at Boat O'Brig	19
UNI107	Severn at Upton	15
UNI108	Trent at Trent Bridge	82
UNI109	Thames at Teddington	88
9	Stations	Total number of years 427

Station Number	No. Yrs.	MAF 3 -1 m s	Area 2 km	Slope	AAR mm	MAR mm	Q(100) ----- MAF
UNI101	45	4.9	9.1	3.3	1000	650	3.1
UNI102	22	17.5	10.4	3.7	2530	2200	5.50
UNI103	19	6.26	21.4	7.5	640	150	2.6
UNI104	53	74.6	218	0.82	1250	850	3.4
UNI105	84	165	1260	0.37	798	361	2.1
UNI106	19	655	2860	0.18	1150	850	3.05
UNI107	15	459	6990	0.05	850	420	1.2
UNI108	82	522	7490	0.063	785	300	2.1
UNI109	88	325	9670	0.032	735	246	2.45

 General Extreme Value fit

Results of G.E.V. fitting to 427 station-years

Intercept U .793 Slope Alpha .283 Curvature K -.2711

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-2.0, -1.5)	4	-1.59	.239	.427	.188
(-1.5, -1.0)	22	-1.21	.444	.501	.058
(-1.0, -.5)	55	-.73	.604	.604	-.000
(-.5, 0.0)	75	-.25	.731	.725	-.006
(0.0, .5)	77	.25	.893	.865	-.028
(.5, 1.0)	62	.74	1.040	1.025	-.016
(1.0, 1.5)	46	1.23	1.196	1.206	.011
(1.5, 2.0)	32	1.73	1.356	1.417	.061
(2.0, 2.5)	22	2.25	1.675	1.671	-.004
(2.5, 3.0)	11	2.73	2.180	1.935	-.245
(3.0, 3.5)	8	3.26	2.260	2.273	.013
(3.5, 4.0)	6	3.63	2.245	2.540	.295
(4.0, 4.5)	3	4.15	3.462	2.963	-.500
(4.5, 5.0)	2	4.77	2.585	3.552	.967
(5.0, 5.5)	2	5.03	2.691	3.836	1.155

5 HIGHEST FLOODS

5	UNI102	4.53	3.254	3.321	.067
4	UNI109	4.78	3.259	3.570	.311
3	UNI101	5.11	5.648	3.929	-1.719
2	UNI101	5.63	5.912	4.560	-1.352
1	UNI101	6.63	6.095	6.060	-.035

Predictions for various return periods

.37	2	.90
1.50	5	1.32
2.25	10	1.67
2.97	20	2.09
3.90	50	2.76
4.60	100	3.38
5.30	200	4.14
6.21	500	5.38
6.91	1000	6.55

USA - Additional notes

The stations in USA have been divided into three sub-regions in an attempt to represent the wide range of climatic regions in the country. The three groups are a north west region, where snowmelt floods predominate, a drier south west region where floods are more variable and an eastern region. With more records and local knowledge, further subdivision could well be useful.

In some of the US records, a historical flood was included in the data, usually because it was higher than the recent series. This historic flood was included in the curve by considering the period over which it was the highest, with the mean annual flood calculated from the recent continuous series alone.

Although the following pages show the standard analysis excluding this historic series, the above modification to the growth curves may be found in the blue folder for USA.

Station USA106, Plum Creek at Louviers, Colorado (SW group) has, in the UNESCO catalogue a very high flood ($Q/MAF = 255$) recorded in 1965. As this dominates the regional curve this station has been removed from the regional analysis for SW USA pending investigation.

 Combined Flood Frequency Analysis - World Flood Study 1983

USA STATIONS

	Catchment Name	No. of years
USA101	Cascade Creek at Petersburg, Alas.	33
USA102	Colorado at Grand Canyon, Ariz.	49
USA103	Salt at Chrysotile, Ariz.	46
USA104	Arkansas at Little Rock, Ark.	44
USA105	Eel at Scotia, Calif.	60
USA106	Plum Creek at Louviers, Colo.	30
USA107	Ute Creek at Fort Garland, Colo.	50
USA108	Altamaha at Doctortown, Ga.	47
USA109	KawaiKoi Stream at Waima, Hawaii	56
USA110	Salmon at White Bird, Idaho.	59
USA111	Ohio at Evansville, Ind.	98
USA112	Red at Alexandria, La.	100
USA113	Connecticut at Montague City, Mass.	68
USA114	Quaboag at West Brimfield, Mass.	59
USA115	Mississippi at St. Paul, Minn.	104
USA116	Mississippi at Vicksburg, Miss.	55
USA117	Salt at Shelbina, Mo.	43
USA118	Judith at Utica, Mont.	47
USA119	Yellowstone at Sidney, Mont.	55
USA120	Big Blue at Barneston, Nebr.	50
USA121	Otter Brook at Keene, N.H.	34
USA122	Beetree Creek at Swannanoa, N.C.	45
USA123	Columbia at The Dalles, Oreg.	114
USA124	Cow Creek at Azalea, Oreg.	43
USA125	Susquehanna at Harrisburg, Pa.	82
USA126	Clinch at Tazewell, Tenn.	48
USA127	San Saba at San Saba, Tex.	56
USA128	Virgin at Virgin, Utah.	62
USA129	James at Buchanan, Va.	80
USA130	Skagit at Concrete, Wash	44
USA131	South Fork Cedar at Lester, Wash.	27
USA132	Middle Crow Creek at Hecla, Wyo.	35

32 Stations

Total number of years 1823

Station Number	No. Yrs.	MAF		Area	Slope	AAR mm	MAR mm	Q(100)
		3	-1					-----
		m	s	Km				MAF
USA101	33	47.9		60	?	?	3760	7.05
USA102	49	2150		357000	?	?	42	2.6
USA103	46	251		7400	?	?	70	?
USA104	44	6702		409000	?	?	86	2.5
USA105	60	4542		8100	?	?	804	4.55
USA106	30	17.1		780	?	?	28	?
USA107	50	4.7		83	?	?	220	3.4
USA108	47	1673		35200	?	?	341	4.25
USA109	56	117		11	?	?	2950	2.9
USA110	59	1812		35100	?	?	283	1.8
USA111	98	15446		277000	?	?	415	2.0
USA112	100	3062		175000	?	?	159	2.05
USA113	68	2667		20400	?	?	590	2.35
USA114	59	34.6		390	?	?	539	2.98
USA115	104	1155		95300	?	?	96	3.8
USA116	55	39309		2960000	?	?	167	1.6
USA117	43	205		1250	?	?	200	3.5
USA118	47	14.8		850	?	?	56	2.3
USA119	55	2101		179000	?	?	65	2.25
USA120	50	384		115000	?	?	59	4.1
USA121	34	37.9		110	?	?	566	5.39
USA122	45	6.6		14	?	?	657	6.21
USA123	114	17055		614000	?	?	283	1.85
USA124	43	81.8		202	?	?	486	3.1
USA125	82	8210		62400	?	?	482	2.4
USA126	48	727		3820	?	?	479	2.3
USA127	56	261		7880	?	?	27	13.00
USA128	62	113		2420	?	?	74	6.21
USA129	80	1126		5370	?	?	403	2.6
USA130	44	2155		7090	?	?	1900	2.25
USA131	27	15.5		16	?	?	2220	7.90
USA132	35	1.6		67	?	?	62	6.10

 Combined Flood Frequency Analysis - World Flood Study 1983

United States South-Western Stations

Catchment Name		No. of years
USA105	Eel at Scotia, Calif.	60
USA128	Virgin at Virgin, Utah.	62
USA102	Colorado at Grand Canyon, Ariz.	49
USA103	Salt at Chrysothile, Ariz.	46
USA107	Ute Creek at Fort Garland, Colo.	50
USA132	Middle Crow Creek at Hecla, Wyo.	35
USA120	Big Blue at Barneston, Nebr.	50
USA127	San Saba at San Saba, Tex.	56
9	Stations	Total number of years 408

 General Extreme Value fit

Results of G.E.V. fitting to 408 station-years

Intercept U .798 Slope Alpha .439 Curvature K -.4592

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-2.0, -1.5)	5	-1.53	.177	.316	.139
(-1.5, -1.0)	21	-1.20	.247	.393	.146
(-1.0, -.5)	54	-.72	.413	.529	.115
(-.5, 0.0)	70	-.24	.639	.699	.060
(0.0, .5)	73	.25	.880	.913	.033
(.5, 1.0)	61	.75	1.273	1.190	-.083
(1.0, 1.5)	43	1.25	1.715	1.536	-.179
(1.5, 2.0)	30	1.74	2.232	1.968	-.264
(2.0, 2.5)	18	2.22	2.766	2.489	-.277
(2.5, 3.0)	14	2.72	3.054	3.177	.123
(3.0, 3.5)	8	3.29	3.661	4.169	.509
(3.5, 4.0)	3	3.65	5.558	4.957	-.601
(4.0, 4.5)	5	4.40	5.165	7.047	1.882
(4.5, 5.0)	3	4.66	10.952	7.970	-2.982

5 HIGHEST FLOODS

5	USA127	4.49	6.904	7.357	.453
4	USA127	4.74	7.248	8.268	1.020
3	USA127	5.07	7.591	9.649	2.058
2	USA132	5.59	8.901	12.291	3.390
1	USA127	6.59	21.896	19.550	-2.346

Predictions for various return periods

.37	2	.97
1.50	5	1.75
2.25	10	2.53
2.97	20	3.58
3.90	50	5.58
4.60	100	7.75
5.30	200	10.73
6.21	500	16.44
6.91	1000	22.67

 Combined Flood Frequency Analysis - World Flood Study 1983

UNITED STATES EASTERN STATIONS

	Catchment Name	No. of years
USA115	Mississippi at St. Paul, Minn.	104
USA117	Salt at Shelbina, Mo.	43
USA104	Arkansas at Little Rock, Ark.	44
USA112	Red at Alexandria, La.	100
USA116	Mississippi at Vicksburg, Miss.	55
USA111	Ohio at Evansville, Ind.	98
USA126	Clinch at Tazewell, Tenn.	48
USA122	Beetree Creek at Swannanoa, N.C.	45
USA129	James at Buchanan, Va.	80
USA108	Altamaha at Doctortown, Ga.	47
USA125	Susquehanna at Harrisburg, Pa.	82
USA114	Quaboag at West Brimfield, Mass.	59
USA113	Connecticut at Montague City, Mass.	68
USA121	Otter Brook at Keene, N.H.	34

14 Stations Total number of years 907

 General Extreme Value fit

Results of G.E.V. fitting to 907 station-years

Intercept U .796 Slope Alpha .253 Curvature K -.3463

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-2.0, -1.5)	8	-1.60	.379	.486	.107
(-1.5, -1.0)	51	-1.21	.410	.546	.136
(-1.0, -.5)	114	-.73	.576	.633	.058
(-.5, 0.0)	160	-.25	.732	.737	.005
(0.0, .5)	162	.25	.911	.861	-.050
(.5, 1.0)	132	.74	1.071	1.009	-.062
(1.0, 1.5)	97	1.23	1.225	1.183	-.043
(1.5, 2.0)	69	1.73	1.412	1.394	-.018
(2.0, 2.5)	44	2.24	1.636	1.651	.015
(2.5, 3.0)	26	2.73	1.854	1.943	.089
(3.0, 3.5)	19	3.25	2.202	2.314	.112
(3.5, 4.0)	8	3.74	2.749	2.733	-.016
(4.0, 4.5)	9	4.29	3.406	3.293	-.113
(4.5, 5.0)	5	4.80	3.991	3.910	-.080
(5.0, 5.5)	3	5.19	2.974	4.470	1.496

5 HIGHEST FLOODS

5	USA121	5.29	4.567	4.630	.063
4	USA108	5.54	5.192	5.038	-.154
3	USA122	5.87	5.849	5.642	-.207
2	USA114	6.39	6.944	6.735	-.209
1	USA114	7.39	10.474	9.497	-.977

Predictions for various return periods

.37	2	.90
1.50	5	1.29
2.25	10	1.66
2.97	20	2.11
3.90	50	2.89
4.60	100	3.66
5.30	200	4.64
6.21	500	6.35
6.91	1000	8.06

 Combined Flood Frequency Analysis - World Flood Study 1983

UNITED STATES NORTH-WESTERN STATIONS

-----		-----
	Catchment Name	No. of years
-----		-----
USA101	Cascade Creek at Petersburg, Alas.	33
USA130	Skagit at Concrete, Wash	44
USA131	South Fork Cedar at Lester, Wash.	27
USA123	Columbia at The Dalles, Oreg.	114
USA124	Cow Creek at Azalea, Oreg.	43
USA110	Salmon at White Bird, Idaho.	59
USA118	Judith at Utica, Mont.	47
USA119	Yellowstone at Sidney, Mont.	55
8	Stations	Total number of years
		422

 General Extreme Value fit

Results of G.E.V. fitting to 422 station-years

Intercept U .812 Slope Alpha .308 Curvature K -.0603

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-2.0, -1.5)	3	-1.58	.382	.348	-.034
(-1.5, -1.0)	25	-1.21	.384	.453	.069
(-1.0, -.5)	52	-.73	.559	.594	.035
(-.5, 0.0)	75	-.25	.752	.737	-.015
(0.0, .5)	75	.25	.928	.889	-.039
(.5, 1.0)	63	.74	1.069	1.047	-.023
(1.0, 1.5)	44	1.24	1.198	1.208	.010
(1.5, 2.0)	33	1.74	1.366	1.377	.011
(2.0, 2.5)	19	2.25	1.542	1.553	.011
(2.5, 3.0)	13	2.73	1.786	1.727	-.059
(3.0, 3.5)	8	3.25	1.758	1.917	.159
(3.5, 4.0)	4	3.72	2.331	2.097	-.233
(4.0, 4.5)	5	4.30	2.138	2.326	.187
(4.5, 5.0)	2	4.62	1.898	2.454	.556
(5.0, 5.5)	1	5.31	2.058	2.742	.684

5 HIGHEST FLOODS

5	USA118	4.52	2.138	2.415	.277
4	USA119	4.77	2.142	2.516	.374
3	USA124	5.10	2.920	2.653	-.267
2	USA131	5.62	3.539	2.874	-.665
1	USA131	5.62	4.267	3.320	-.947

Predictions for various return periods

.37	2	.93
1.50	5	1.30
2.25	10	1.56
2.97	20	1.81
3.90	50	2.17
4.60	100	2.45
5.30	200	2.74
6.21	500	3.14
6.91	1000	3.45

USSR - additional note

The stations in USSR have been divided into three sub-regions in an attempt to represent the wide range of climatic regions in the country. The three groups are a north west region, where snowmelt floods predominate, a drier south west region where floods are more variable and an eastern region. With more records and local knowledge, further sub-divisions could well be useful.

 Combined Flood Frequency Analysis - World Flood Study 1983

USSR STATIONS

	Catchment Name	No. of years
USS101	Pechora at Ust-Tsilima	41
USS102	Mezen at Malonisogorskaya	52
USS103	Vaga at Filaevskaya	35
USS104	Verebushka at OKsotchi	27
USS105	Lovat at Kholm	51
USS106	Dnieper at Smolensk	87
USS107	Pripiat at Mozir	90
USS110	Don at Razdorskaya	71
USS111	Medveditsa at Archedinskaya	43
USS112	Teberda at Teberda	39
USS113	Kalaus at Svetlograd	41
USS114	Terek at Ordzhonikidze	50
USS115	Unzha at Makariev	77
USS116	Ishim at Tselinograd	40
USS117	Ishim at Petropavlovsk	39
USS118	Ob at Salekhard	43
USS119	Pur at Samburg	34
USS120	Biya at Biysk	45
USS121	Usa at Mezhdourechensk	36
USS122	Tym at Napas	36
USS123	Yenisei at Yeniseisk	62
USS124	Abakan at Abaza	40
USS125	Tuba at Bugurtak	57
USS126	Craviyka at Igarka	33
USS127	Selenga at Mostovoy	39
USS128	Khilok at Maleta	37
USS129	Bolshaya at Possolskaya	39
USS130	Vitim at Romanovka	29
USS131	Lena at Kusun	35
USS132	Indigirka at Vorontsovo	36
USS134	Timpton at Nagorni	42
USS135	Kolyma at Ust-Srednikan	40
USS136	Anguema at mouth of the brook Shoumny	28
USS137	Iziskatelski at 1.6km upstream the mouth	25
USS138	Khasyn at Kolyma Road 79km	32
USS139	Dep at Rychkovo	30
USS140	Ussuri at Kirovsky	46
USS141	Souyfoun at Terekhovka	44

38 Stations

Total number of years 1671

Station Number	No. Yrs.	MAF	Area	Slope	AAR	MAR	Q(100)
		3 -1 m s	2 km		mm	mm	----- MAF
USS101	41	24085	248000	?	734	447	1.7
USS102	52	5764	56400	0.48	691	366	1.8
USS103	35	1139	13200	0.63	724	286	2.1
USS104	27	14.81	96.3	3.57	700	312	1.95
USS105	51	973	14700	0.38	650	228	2.2
USS106	87	825	14100	0.19	630	216	2.2
USS107	90	1605	101000	0.10	550	117	3.45
USS110	71	5606	37800	?	404	71	2.6
USS111	43	707	33700	0.35	400	61	3.5
USS112	39	178	504	32	1780	1700	1.95
USS113	41	66.2	4540	1.8	474	20	10.61
USS114	50	165	1490	26	852	736	2.7
USS115	77	1483	18500	0.31	525	286	1.7
USS116	40	233	7400	1.04	297	27	6.10
USS117	38	420	10600	0.30	312	17	12.28
USS118	43	36320	2430000	?	416	157	1.3
USS119	34	6197	95100	?	451	292	1.4
USS120	45	2857	36900	?	640	417	2.15
USS121	36	1603	3230	7.00	?	1390	1.95
USS122	36	789	24500	0.15	531	232	1.6
USS123	62	31629	1400000	?	?	174	1.8
USS124	40	2614	14400	5.8	1270	658	2.5
USS125	57	5048	31800	4.7	1110	750	2.0
USS126	33	111	323	1.6	705	504	2.3
USS127	39	3546	440000	?	?	67	2.2
USS128	37	459	25700	?	410	90	2.3
USS129	39	103	565	12.6	840	697	4.5
USS130	29	1514	18200	2.2	440	85	2.7
USS131	351330	1142	2430000	?	215	?	1.5
USS132	36	8474	305000	?	420	162	1.55
USS133	36	372	1000	8.3	380	420	2.2
USS134	42	263	613	10.8	600	489	2.7
USS135	40	7164	99400	?	392	232	2.5
USS136	28	3723	26700	?	?	331	2.0
USS137	25	10.8	13.2	100	?	836	8.40
USS138	32	192	682	16.9	?	464	3.25
USS139	30	766	8440	2.3	650	289	4.0
USS140	46	1615	24400	3.7	800	273	7.78
USS141	44	776	15500	2.5	800	150	9.48

 Combined Flood Frequency Analysis - World Flood Study 1983

Stations in SW USSR

Catchment Name		No. of years
USS104	Verebushka at OKsotchi	27
USS105	Lovat at Kholm	51
USS106	Dnieper at Smolensk	87
USS107	Pripiat at Mozir	90
USS110	Don at Razdorskaya	71
USS111	Medveditsa at Archedinskaya	43
USS112	Teberda at Teberda	39
USS113	Kalaus at Svetlograd	41
USS114	Terek at Ordzhonikidze	50
USS115	Unzha at Makariev	77
USS116	Ishim at Tselinograd	40
USS117	Ishim at Petropavlovsk	39
12	Stations	Total number of years 655

 General Extreme Value fit

Results of G.E.V. fitting to 655 station-years

Intercept U .783 Slope Alpha .430 Curvature K -.2444

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-2.0, -1.5)	6	-1.57	.338	.222	-.116
(-1.5, -1.0)	39	-1.19	.337	.338	.000
(-1.0, -.5)	81	-.72	.483	.500	.017
(-.5, 0.0)	114	-.24	.654	.681	.027
(0.0, .5)	116	.24	.867	.890	.023
(.5, 1.0)	97	.73	1.116	1.129	.014
(1.0, 1.5)	72	1.24	1.452	1.404	-.048
(1.5, 2.0)	49	1.74	1.855	1.719	-.137
(2.0, 2.5)	30	2.24	2.185	2.067	-.119
(2.5, 3.0)	21	2.75	2.426	2.469	.042
(3.0, 3.5)	12	3.29	3.204	2.952	-.252
(3.5, 4.0)	5	3.74	2.141	3.410	1.269
(4.0, 4.5)	8	4.25	4.272	3.993	-.279
(4.5, 5.0)	3	4.76	2.098	4.652	2.554
(5.0, 5.5)	2	5.06	2.868	5.086	2.217

5 HIGHEST FLOODS

5	USS113	4.96	6.568	4.946	-1.622
4	USS113	5.21	7.549	5.316	-2.233
3	USS117	5.54	7.943	5.846	-2.097
2	USS117	6.06	8.918	6.766	-2.152
1	USS117	7.06	8.942	8.911	-.031

Predictions for various return periods

.37	2	.95
1.50	5	1.56
2.25	10	2.07
2.97	20	2.66
3.90	50	3.59
4.60	100	4.44
5.30	200	5.45
6.21	500	7.06
6.91	1000	8.55

 Combined Flood Frequency Analysis - World Flood Study 1983

Stations in eastern USSR

Catchment Name		No. of years
USS120	Biya at Biysk	45
USS121	Usa at Mezhdourechensk	36
USS123	Yenisei at Yeniseisk	62
USS124	Abakan at Abaza	40
USS125	Tuba at Bugurtak	57
USS126	Graviyka at Igarka	33
USS127	Selenga at Mostovoy	39
USS128	Khilok at Maleta	37
USS129	Bolshaya at Possolskaya	39
USS130	Vitim at Romanovka	29
USS131	Lena at Kusun	35
USS132	Indigirka at Vorontsovo	36
USS133	Zbitiem at Zbetem	36
USS134	Timpton at Nagorni	42
USS135	Kolyma at Ust-Srednikan	40
USS136	Amguema at mouth of the brook Shoumny	28
USS137	Iziskatelski at 1.6km upstream the mouth	25
USS138	Khasyn at Kolyma Road 79km	32
USS139	Dep at Rychkovo	30
USS140	Ussuri at Kirovsky	46
USS141	Souyfoun at Terekhovka	44
21	Stations	Total number of years 811

 General Extreme Value fit

Results of G.E.V. fitting to 811 station-years

Intercept U .818 Slope Alpha .305 Curvature K -.2788

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-2.0, -1.5)	2	-1.54	.583	.436	-.147
(-1.5, -1.0)	51	-1.23	.473	.501	.028
(-1.0, -.5)	102	-.72	.599	.618	.019
(-.5, 0.0)	143	-.24	.741	.746	.005
(0.0, .5)	145	.25	.904	.896	-.008
(.5, 1.0)	118	.74	1.083	1.068	-.014
(1.0, 1.5)	89	1.24	1.264	1.268	.004
(1.5, 2.0)	56	1.72	1.500	1.492	-.008
(2.0, 2.5)	42	2.22	1.857	1.752	-.105
(2.5, 3.0)	23	2.72	2.109	2.055	-.054
(3.0, 3.5)	17	3.20	2.406	2.394	-.012
(3.5, 4.0)	6	3.82	2.891	2.897	.006
(4.0, 4.5)	15	4.23	2.867	3.276	.409
(4.5, 5.0)	2	4.66	1.947	3.734	1.786

5 HIGHEST FLOODS

5	USS140	5.18	5.806	4.355	-1.451
4	USS141	5.43	6.231	4.688	-1.543
3	USS140	5.76	6.375	5.166	-1.209
2	USS141	6.27	7.193	6.010	-1.173
1	USS141	7.28	7.441	8.032	.591

Predictions for various return periods

.37	2	.94
1.50	5	1.38
2.25	10	1.77
2.97	20	2.23
3.90	50	2.97
4.60	100	3.67
5.30	200	4.51
6.21	500	5.91
6.91	1000	7.23

 Combined Flood Frequency Analysis - World Flood Study 1983

Stations in NW USSR

Catchment Name		No. of years
USS101	Pechora at Ust-Tsilima	41
USS102	Mezen at Malonisogorskaya	52
USS103	Vaga at Filaevskaya	35
USS118	Ob at Salekhard	43
USS119	Pur at Samburg	34
5	Stations	Total number of years 205

 General Extreme Value fit

Results of G.E.V. fitting to 205 station-years

Intercept U .905 Slope Alpha .201 Curvature K .1071

Y Interval	No.	Mean Y	Q/Qbar	Fitted	Residual
(-2.0, -1.5)	1	-1.51	.494	.576	.082
(-1.5, -1.0)	12	-1.23	.640	.642	.003
(-1.0, -.5)	26	-.73	.750	.753	.004
(-.5, 0.0)	36	-.24	.863	.855	-.007
(0.0, .5)	35	.23	.951	.952	.000
(.5, 1.0)	31	.72	1.043	1.044	.002
(1.0, 1.5)	23	1.23	1.154	1.136	-.018
(1.5, 2.0)	16	1.75	1.219	1.225	.006
(2.0, 2.5)	9	2.25	1.282	1.307	.025
(2.5, 3.0)	6	2.73	1.373	1.380	.007
(3.0, 3.5)	4	3.20	1.418	1.450	.032
(3.5, 4.0)	1	3.52	1.568	1.494	-.074
(4.0, 4.5)	4	4.22	1.493	1.586	.094
(4.5, 5.0)	1	4.53	1.653	1.626	-.027

5 HIGHEST FLOODS

5	USS102	3.80	1.568	1.531	-.037
4	USS101	4.05	1.640	1.564	-.076
3	USS102	4.38	1.653	1.607	-.046
2	USS103	4.90	1.834	1.670	-.164
1	USS103	5.90	1.843	1.783	-.060

Predictions for various return periods

.37	2	.98
1.50	5	1.19
2.25	10	1.31
2.97	20	1.42
3.90	50	1.55
4.60	100	1.63
5.30	200	1.72
6.21	500	1.82