

Dynamic Management of Dam Reservoirs During Flooding: A Review of Decision-Making Between Storage and Discharge



Conclusion

Flood Management

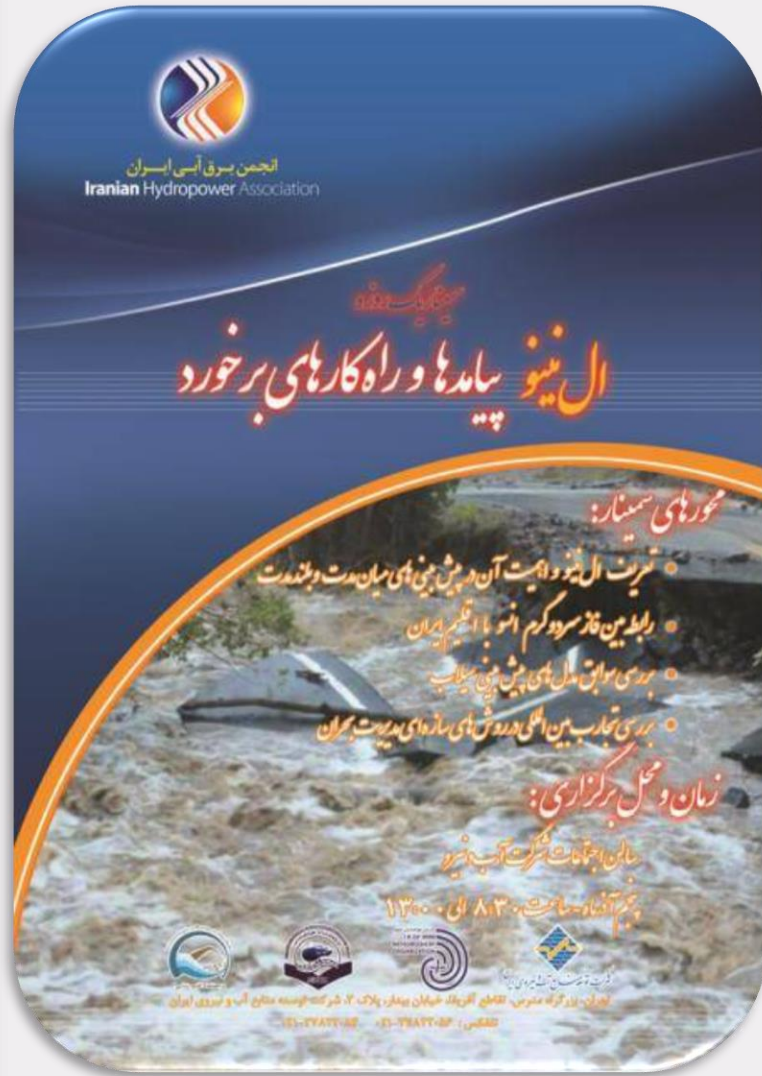
Elnino & Iran



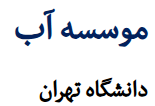
SAEED JAMALI
Scientific Research Manager

Conclusion

Flood Management



El Niño & Iran



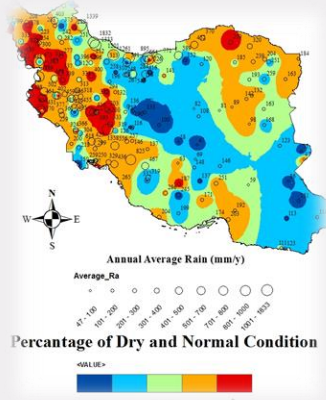


Conclusion

Flood Management

01

Strong predictor for water years in Iran, particularly in the Great Karun Basin



02

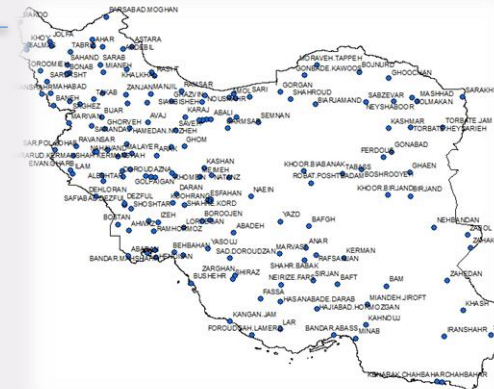
Great Karun Basin: High probability of no drought during El Niño years

03

No correlation found between El Niño intensity and wet year severity

04

Extreme El Niño events: Can influence frequency of extreme flood events



El Niño
& Iran

Flood Frequency in the Karun Basin at Karun 3 Dam During El Niño, La Niña, and Normal Periods

Condition	Flood Frequency	Percentage Frequency	Frequency in 10 Major Floods	Frequency in 20 Major Floods
El Niño	۲۸	۳۵%	۷	۱۱
La Niño	۱۳	۱۶%	۱	۱
Neutral	۳۹	۴۹%	۲	۸
Total	۸۰	۱۰۰%	۱۰	۲۰

Peak discharge of the top 10 major floods: $> 2,500 \text{ m}^3/\text{s}$

Peak discharge of the top 20 major floods: $> 2,050 \text{ m}^3/\text{s}$

29% of the floods during El Niño years occurred in April (Farvardin), and ۲۱% occurred in December (Azar)



Evaluation of Seasonal Yield of the Great Karun Basin in El Niño Periods – Million Cubic Meters

Season	Autumn	Winter	Spring	Summer
Long Average Yield	۲۹۰۰	۶۰۰۰	8800	۲۹۰۰
El Niño	3700	7000	11000	۳۱۰۰
Growth rate	22%	14%	20%	6%



Conclusion

Flood
Management

El Niño
& Karun

Comprehensive Flood Management Plan Framework



1

Forecasting & Early Warning

A circular inset image showing a computer monitor displaying a weather map with various colored regions, set against a background of a cloudy sky.

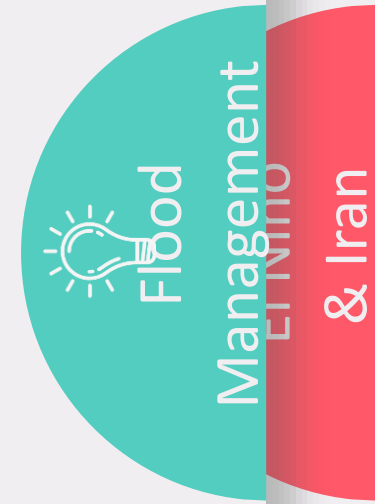
2

Flood Control Planning for Dam Reservoirs

A circular inset image showing a large concrete dam structure with water behind it, set against a backdrop of mountains.

3

Management and Control of Flooding in Rivers and Floodplains

A circular inset image showing a wide river flowing through a city, with floodplains visible on either side.



Conclusion

Flood Control Planning for Dam Reservoirs

- Systematic studies on the analysis of flood intensity and frequency in the river basin
- Development of a flood routing model for dam reservoirs
- Preparation of flood control rule curves for dam reservoirs
- Development of guidelines for the optimal operation of spillway gates and other outlets

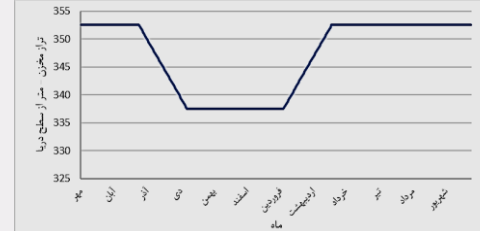
Management and Control of Flooding in Rivers and Floodplains

- Hydraulic flood studies and development of flood routing and inundation mapping models
- Flood damage assessment studies
- Study of structural and non-structural flood control methods in rivers
- Design and formulation of emergency response plans for crisis situations



Flood Management

ETNNIO
& Iran



Dynamic Method

Instructions under different conditions



Requires flood forecasting systems



Complex in terms of implementation



Higher risk and probability of error



Greater efficiency in flood management and optimal



at weekly, daily, etc. time steps

Traditional Method

Simple: A fixed rule for all conditions



No need for flood forecasting and warning systems



Simple in terms of implementation



Conservative and reliable



Lower efficiency in flood control and reducing its damages



it follows more of the general lines of operating policies on a monthly time step



Conclusion



Flood

Management

in Iran

& Iran

Dynamic Vs. Traditional; Which one?

Existing infrastructure in the basin for flood forecasting and their accuracy and efficiency

Operational limitations in exploiting dams for storage (in terms of volume) and flood release — (gated or ungated

Location of the dam relative to flood-prone areas

Capacity and facilities of the dam reservoir for temporary flood storage

Dam operation and its importance



Conclusion

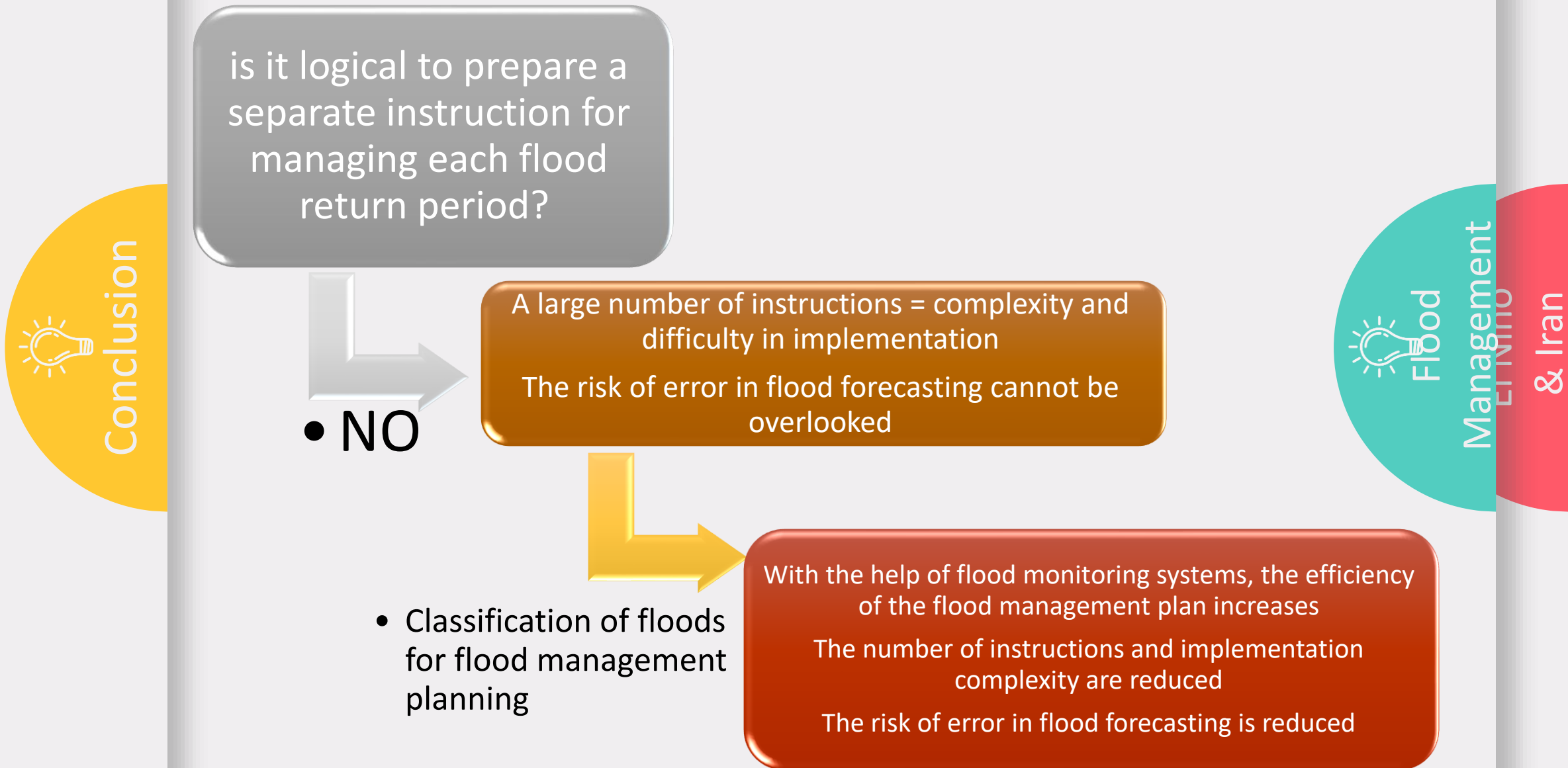


Flood

Management

& Iran

Planning Approach for Flood Management in Dam Reservoirs



Planning Approach for Flood Management in Dam Reservoirs

Instruction No.	Flood Name	Return Periods	Main Objective of the Instruction
۱	 Small floods	2 to 50 years	Protection of all downstream
۲	 Medium floods	Greater than 50 years to 500 years	Protection of large cities and reduction of damages to agricultural lands, rural areas, and small cities
۳	 Large floods	Greater than 500 years	Safety of the dam body and reduction of flood damages downstream



Conclusion



Flood
Management

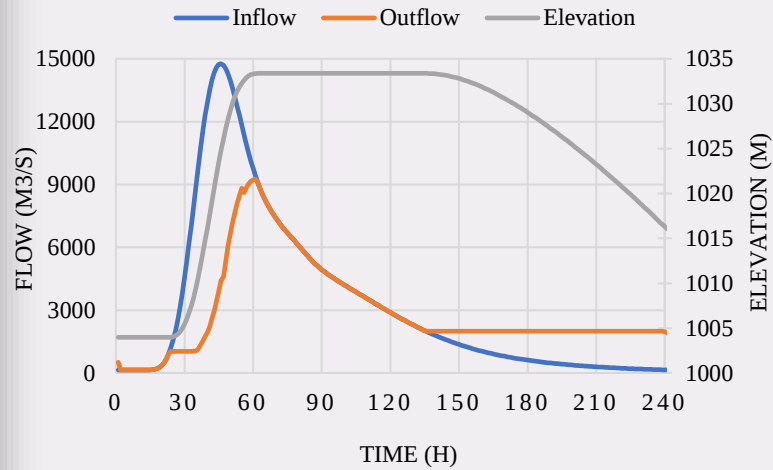
& Iran

Planning Approach for Flood Management in Dam Reservoirs

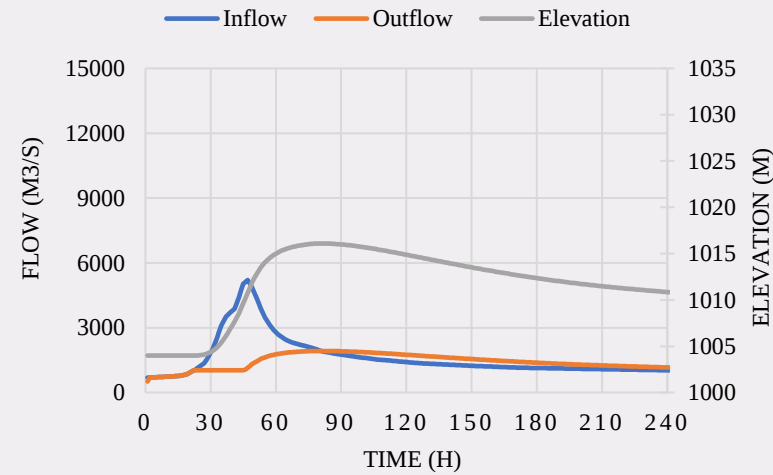


Conclusion

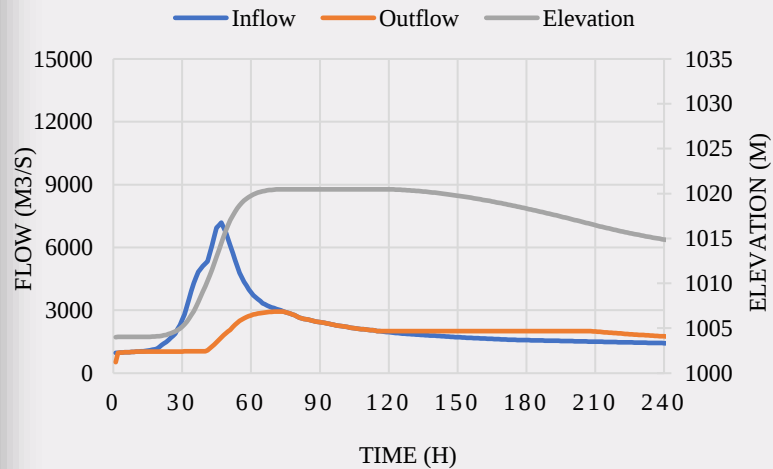
KAROON4 DAM - PMF



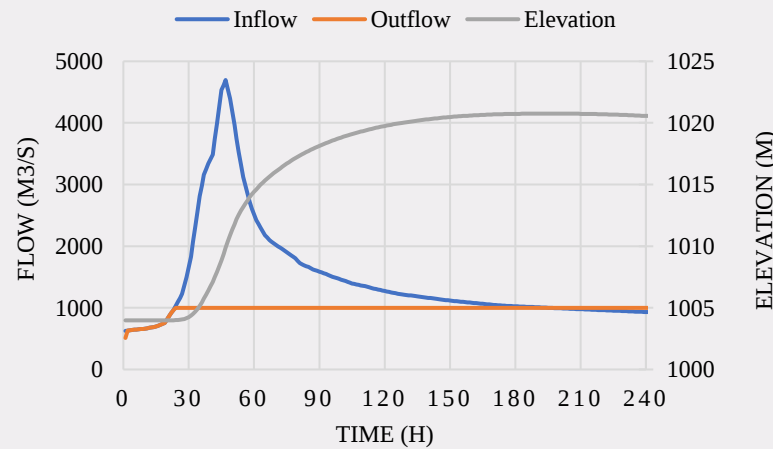
KAROON4 DAM - RP = 1000 YEARS



KAROON4 DAM - RP = 10000 YEARS



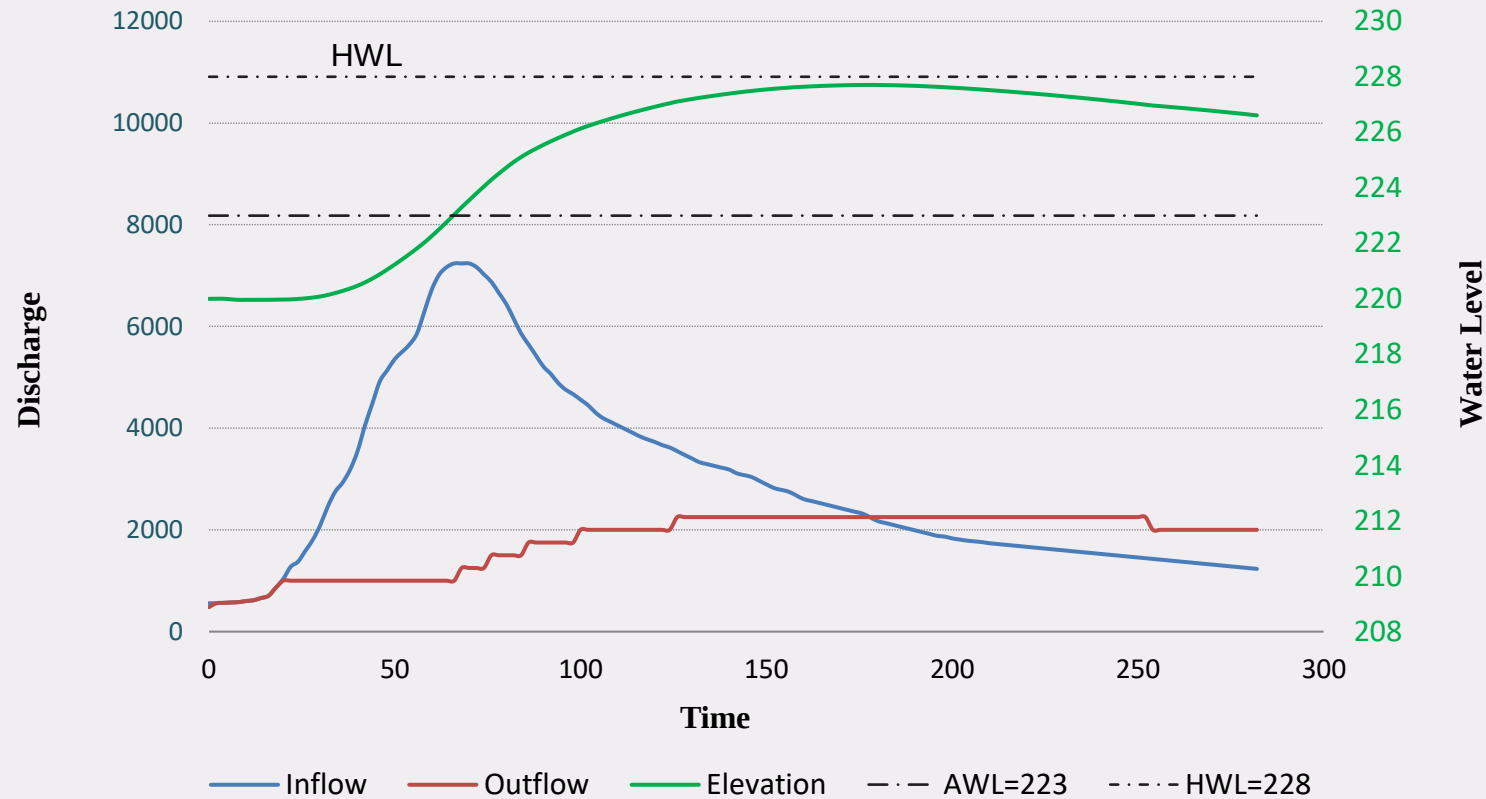
KAROON4 DAM - RP = 500 YEARS



Flood
Management

& Iran

Planning Approach for Flood Management in Dam Reservoirs



FCWL: Flood Control Water Level
 NWL: Normal Water Level
 AWL: Alarm Water Level
 HWL: Hazard Water Level

مرجع: مطالعات بررسی و بهنگام سازی تخصیص آب در حوضه کارون بزرگ

طراحی برنامه مدیریت سیلاب در مخازن سدهای برقابی حوضه کارون و دز



شرکت مهندسی مشاور دزآب



شرکت توسعه منابع آب و نیروی ایران

Conclusion

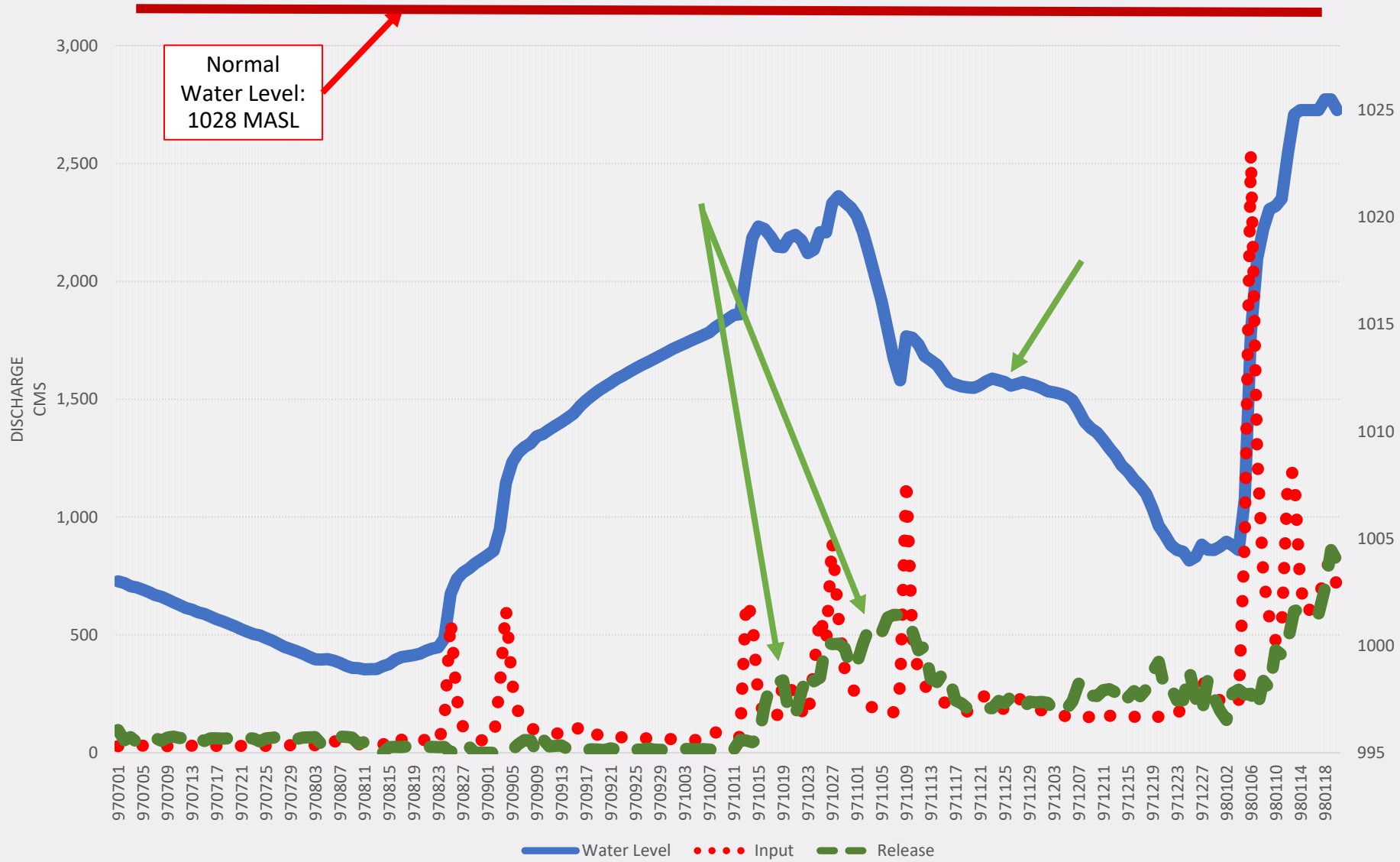


Flood

Management

& Iran

K4

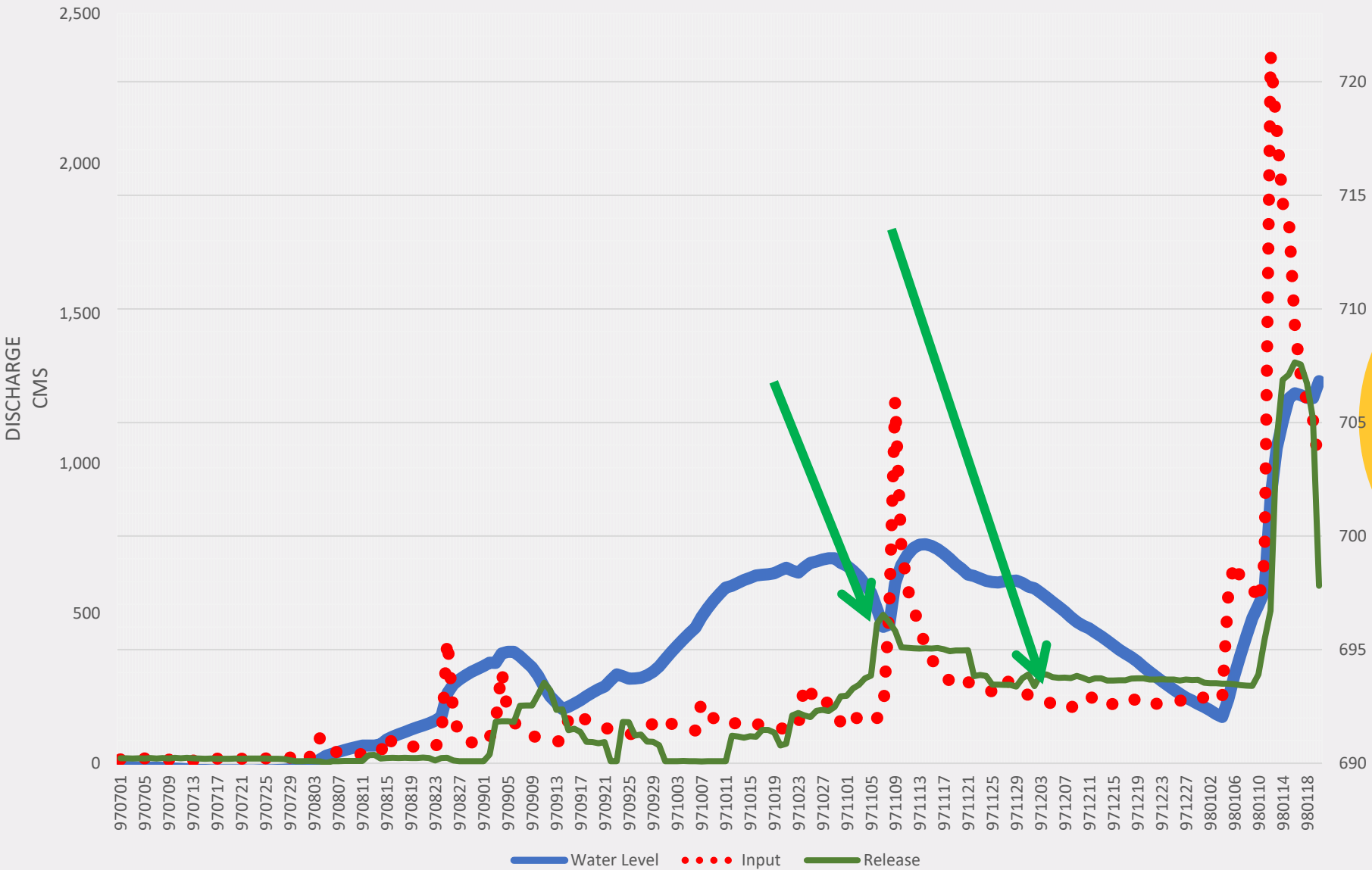


Conclusion

Flood Management

ETIOPIA & Iran

Saymareh



WATER LEVEL MASL

Conclusion

Flood Management

ETNN

& Iran



Economy & Flood Management



Research & Training



Knowledge Management & Lesson Learned



Conclusion

Management

& Iran

