

Analysis of Flood Management in the Chao Phraya River Basins

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Project:

Improving Flood Management
in Thailand

Research leader:

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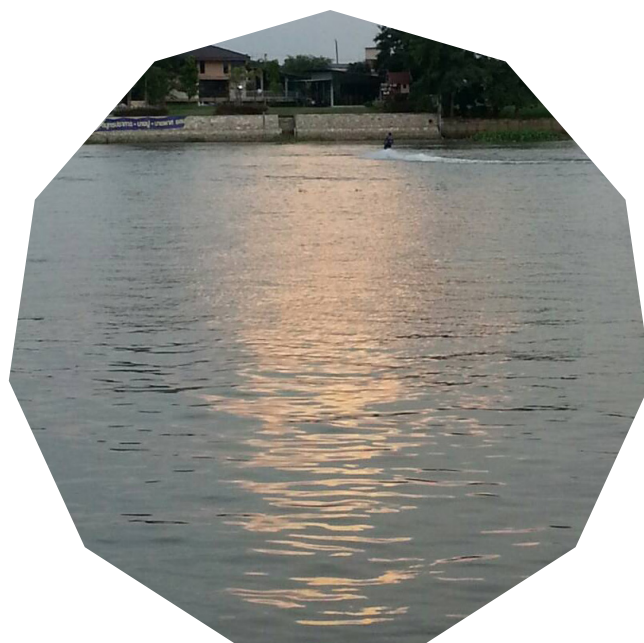
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Background

The Chao Phraya river basin is the largest in Thailand covering 157,924 square kilometers or 35 percent of the country. It is comprised of the Ping, Wang, Yom and Nan river basins in the upper north. The Wang River joins the Ping River while the Yom River merges with the Nan River, with both rivers eventually joining to make the Chao Phraya River in Nakhon Sawan province. From here the Chao Phraya River flows through the predominantly low lying central plains of the country. Flood propagation is slowed due to the topographic conditions and it can take months for flooded water to drain out to the Gulf of Thailand. There are two large dams in the Upper North, the Bhumibol dam on the Ping River Basin and the Sirikit dam on the Nan River Basin. There is a diversion dam, the Chao Phraya dam, that is used to control water levels for irrigation projects. The Pasak River joins the Chao Phraya River in Ayutthaya province and the Thachin River is a tributary of the Chao Phraya River. Figure 1 shows the Chao Phraya River Basin.

The Chao Phraya River Basin was subject to flooding in 1942, 1978, 1983, 1995, 2002, 2006

and 2011. The largest flood event occurred in 2011 with flood volumes reaching the highest level in 102 years. These levels created tremendous impacts on the country. Therefore, Thailand must have a strategy to continuously implement flood management plans throughout Chao Phraya River Basins.

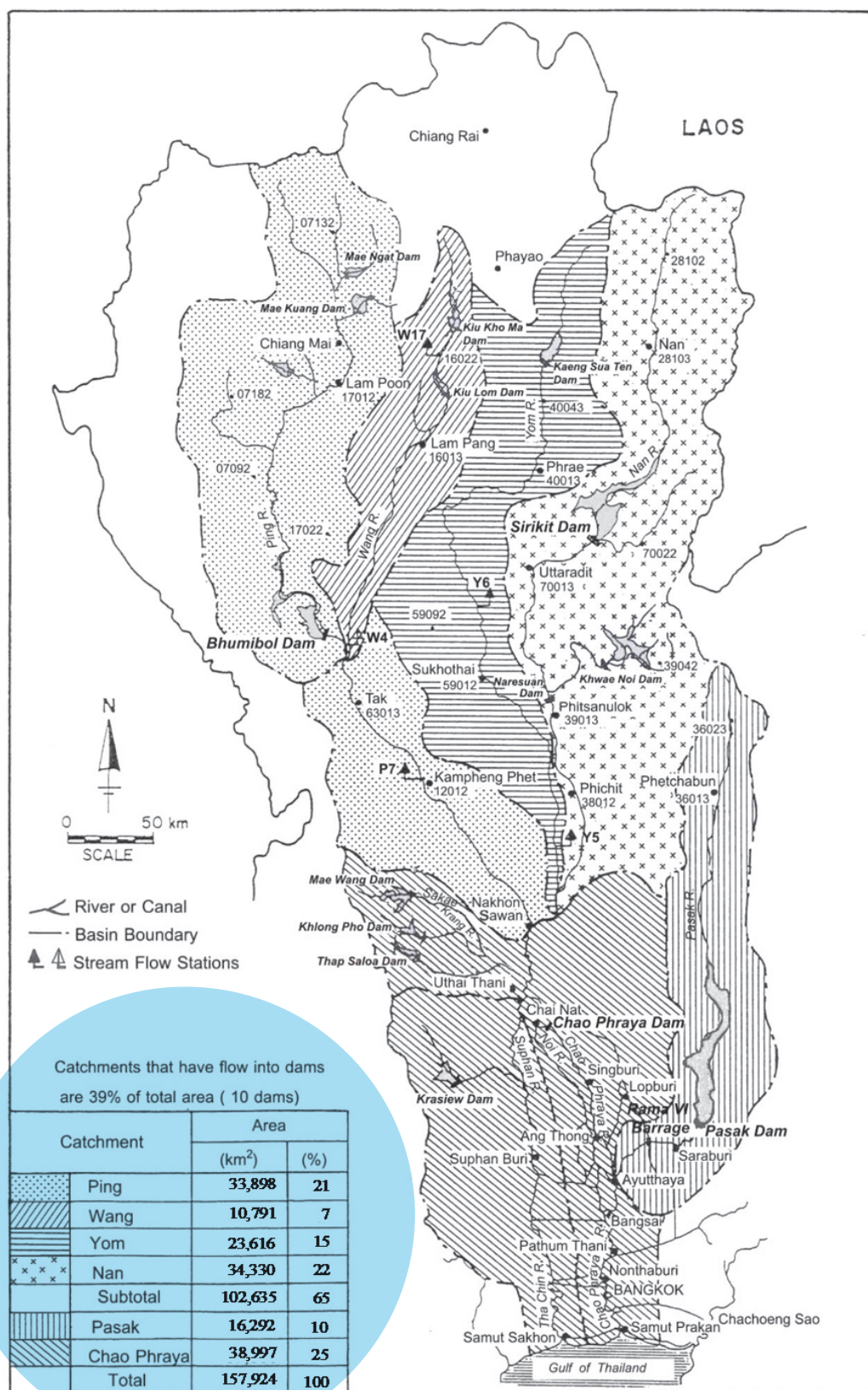
Objectives of Study

- 1) To analyze and evaluate the present infrastructures and institutions that manage flooding.
- 2) To compare the already developed national flood alleviation plans.
- 3) To recommend approaches that will drive long term planning and actual operations.

Methodology

- 1) Review the literature, studies, and reports that predominantly appear after the flood events.
- 2) Analyze the national strategic study for flood alleviation.
- 3) Conduct field investigation to determine the operational problems during floods and examine infrastructure for flood control.

Figure 1 Chao Phraya River Basin



Conclusions and Recommendations

1. It is necessary to carry out intensive studies to have new infrastructure to manage large scale floods and it should be a successive work from the JICA (2013) study. This proposed study must be conclusive, finalized and implemented.

The present system for flood management is composed of irrigation structures more than 50 years old and that can cope with small and medium flood levels with return periods of five to 15 years. These structures could not be applied to the flooding in 1995, 2006 and 2011. The JICA (2013) study covered a number of aspects for flood control and it can be used as a starting point for feasibilities for other alternatives such as flood diversion. Figure 2 shows flood alternatives for diversion routes.

It is recommended that there be infrastructure development to cope with the large scale floods in the plan and to implement it.

2. In order to have a conclusive study for new infrastructure development, this concept must be kept continuous and firm. Figure 3 shows a number of studies which were carried out after floods in the past. It shows that the concept framework was changed from time to time and it could not be finalized. The process to have a specific study for each measure is slow. One example is a study to use retention in an irrigation area by TEAM (2011) which is a consequence of the conceptual framework in JICA (1999). There is still no formal implementation in this measure.

In addition, the flood and water shortage aspects should be merged into the study since 2015 is supposed to be a year having low rainfall. JICA (2013) included an emphasis for flooding.

It is recommended to put drought conditions in the concept of flood management so that one solution can be provided for both problems. The concept/plan should not be attended and fluctuated from time to time. It must be continuously implemented in the long term plan.

3. The strategic plan for water management developed recently by the Water Management and Policy Committee (WMPC) combined with the

JICA (2013) study should be used for further study. The former completely covers all aspects and problems that occur in river basins while the latter has a strong engineering emphasis. A discussion and comparison of comprehensive flood management plans and strategies for water management are conducted in Table 1. The time frame is for a duration of 10 years during which it is possible to carefully consider the results from intensive studies and include them in the flood management plan.

It is recommended to use strategic plans developed by the WMPC with engineering support from JICA (2013) as a starting plan for Chao Phraya flood management.

4. The National Water Resources Board (NWRB), which will be renovated and re-established with strengthened responsibilities should be a core agency in the near future. Strategic planning will be driving force throughout this organization. One of the most important jobs is to have an “Area Based Integration for Water Resources Development”. It will provide the co-ordination from many government agencies for water resources development that will allow them to work together with a common target/goal. However, the NWRM has authority for all 25 river basins in Thailand which is too broad for daily operation. The level of work then should be divided into two categories. The first will be Policy Strategic planning and management, while the second one is co-ordination for operational planning and management. The strategy and policy can then be worked out in this committee for national level and smaller scale with river basin committee. The secretariat of NRWB will work daily in the second categories with other agencies.

The Subcommittee for Monitoring and Analysis of Water Situation (SMAWS) which was working well with modern tools for the decision support system and the national data base for water resources can be useful to assist the NRWB for decision making especially during water crisis based on technical issues. In this case, the standard for operation can then be established such as standards for telemetering stations (equipment, communication, location, etc.), and for dike construction, etc.,

Figure 2 Flood alternatives for diversion routes

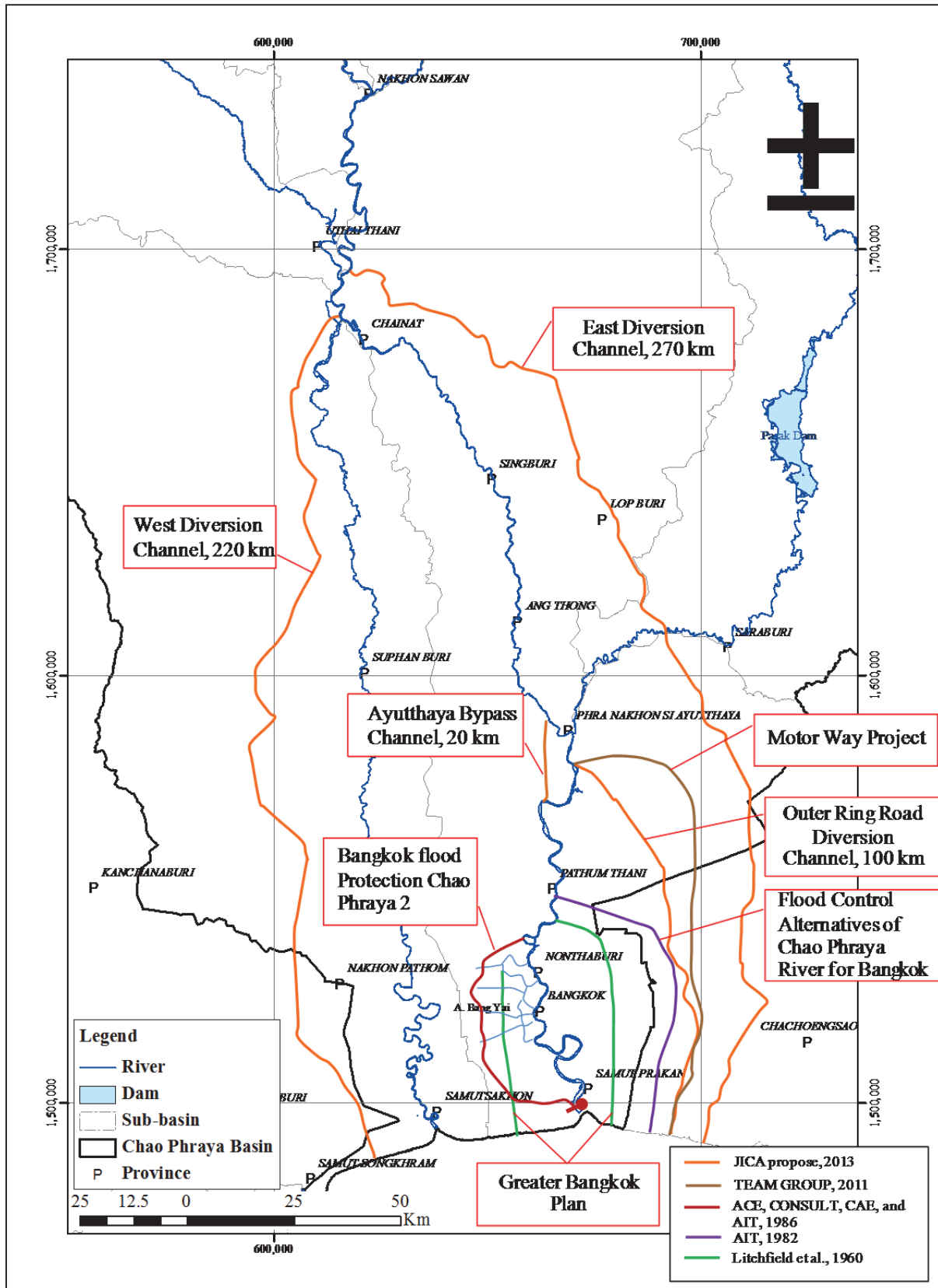
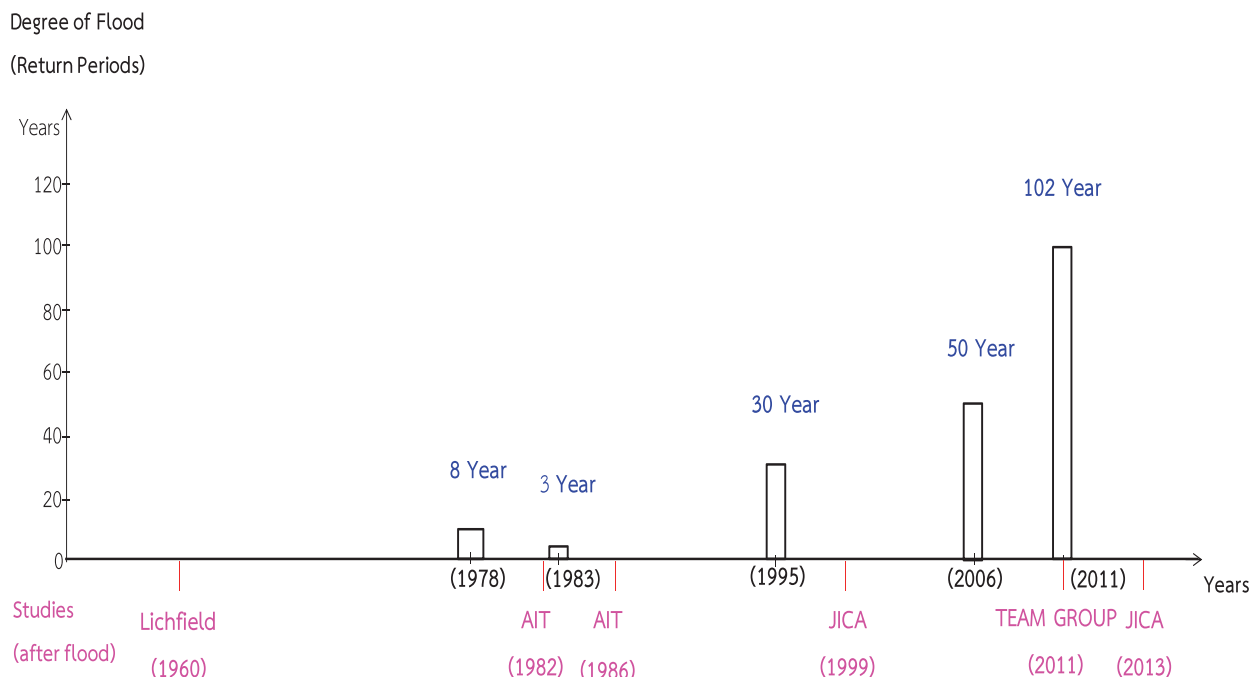


Figure 3 Time Flame of Flood and Relevant Studies Reports



which are very useful and are the technical core of development for flood management in the future.

REFERENCES

- Asian Institute of Technology (AIT). 1982. Flood Control Alternatives of Chao Phraya River for Bangkok, Project Proposal.
- Chuenchooklin, S., Mekprugsawong, P., and Chidchob, P. 2007. "The River Analysis Simulation Model for the Planning of Retention Area and Diversion Channel for Flood Reduction in the Lower Yom's River Basin, Thailand." The 4th INWEPF Steering Meeting and Symposium, Paper 2-01, 1-13.
- Japan International Cooperation Agency (JICA). 1999. The study on Integrated Plan for Flood Mitigation in Chao Phraya River Basin, Final Report, August.
- Japan International Cooperation Agency (JICA). 2013. "The Comprehensive Flood Management Plan for the Chao Phraya River Basin".
- Kanjanawan Nilklud. 2013. "Hydrological and Hydraulic Analyses of Great Flood of 2011 in Thailand, AIT Thesis, WM-13-13.
- Litchfield, Whiting, Bowne and Associates. 1960. "Greater Bangkok Plan B.E. 2533." International Architects and Engineers, Bangkok.
- TEAM Consulting Engineering and Management Co., Ltd. 2011. Proposed Plan for Flood Control and Protection in Chao Phraya Basin for the Chao Phraya River Basin.
- Thai-Austrian-Consortium, ACE-CONSULTCO-CAE, and AIT. 2529. Project on Flood Prevention in Bangkok (Chao Phraya 2), Executive Summary of the Final Report (in Thai).
- Water Resources Engineering Research Lab, WAREE. 2014. Setting up Direction of National Policy and Master Plan for Integrated Water Resources Management and Research to Reduce Impact of Water Disasters. Department of Civil Engineering, King Mongkut's University of Technology Thonburi (in Thai).

Table 1 Comparison of Concepts and Implementation/Driving for Water Resources Development Strategy/Plan

Items	Comprehensive Flood Management (JICA 2013)	Strategies for Floods Alleviation (SCWRM 2013)	Strategies for Water Resources Management (WMPC 2015)
1. Details	Focus on technical/engineering flood management, improvement of dam's rule curve, dike construction, use of retention in irrigation area, river improvement, propose flood diversion, preliminary study for socio-economic and environment assessment.	<p><u>Module A in Chao Phraya river basin;</u> There are 8 plans as follows: Preservation and restoring forest and ecological system, Reservoir management, Restoration and improvement for river, Development of water resources database for forecasting and warning, Development of emergency flood plan, Promote use of retention with support measures, Improvement of organization for flood management, Include people for comprehension and recognition participation for flood management</p> <p><u>Module B in other river basins;</u> Preservation and restoring forest and land, Construction of reservoirs, Development of land use map, River improvement, Development of water resources database for flood warning and forecasting and Development of flood management and remedies.</p> <p>Time Frame is 5 years.</p>	<p><i>There are 6 strategies as follows;</i> Management of water for consumption for people, Water security for production (Agricultural and Industrial sectors), Flood management , Water quality improvement, Restoration of deteriorated forest and prevention of soil erosion and Water management</p> <p>Time frame is 10 years.</p>
2. Concept	The approach is traditional engineering. There must be a number of study followed this report such as feasibility study, environmental impact, etc. When all details are presented and public accepted then plan will be implemented.	To speed up work to completed in 5 years. There is not much detail study to support documents in modules. It is hard to complete in the specified time.	It is a frame work for strategic plan. No detail to implement each strategy. Only goal/ target are specified such as to complete work of water consumption in village level in 10 years but no detail whether surface or subsurface water resources to be used.
3. Driving the plan	Need more detail study of each proposed infrastructures.	Use Water Resources Flood Management Committee (WRFMC) which has been demolished.	Use National Water Resources Board (NWRB) which to be re-established and strengthen its responsibility and use Water Resources Law for long term.
4. Recommendation	<p>1) Use NWRB to drive the strategic plan for its strategy and policy</p> <p>2) Use JICA(2013) study as original point for further study for Chao Phraya River Basin</p>		



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