



Practices of small hydropower and dam removal in China

Zhenhua Cui

National Research Institute for Rural Electrification, China.

Hangzhou Regional Center (Asia-Pacific) for Small Hydro Power (HRC), China

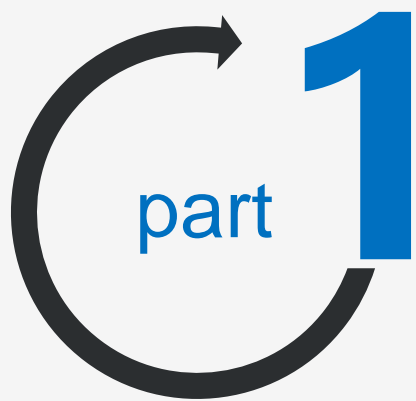
E-mail: zhcui@hrcshp.org; 250191770@qq.com

Hudiksvall, Sweden



CONTENT

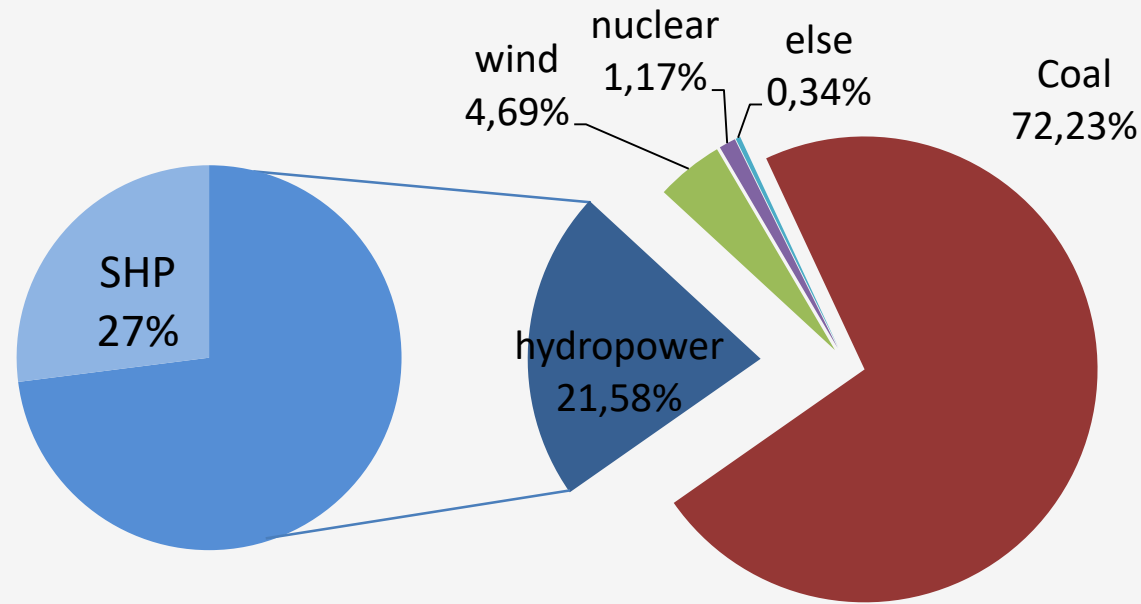
- 1. Background**
- 2. Cases**
- 3. Summary**



Background

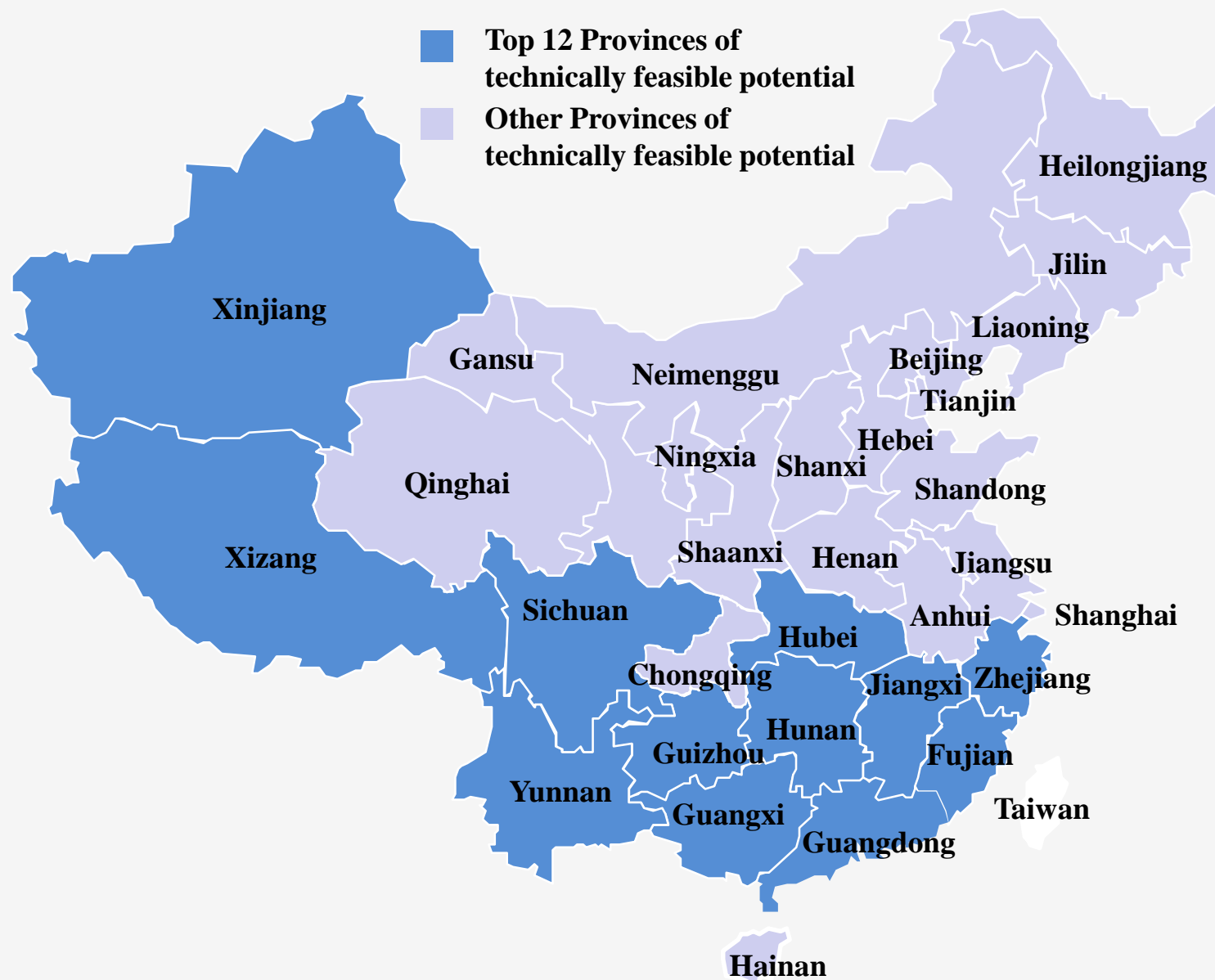
1. Background

There are 47,498 SHP projects ($\leq 50\text{MW}$) and more than 98000 dams in China.
All rivers are public, not private.



Install capacity

1. Background

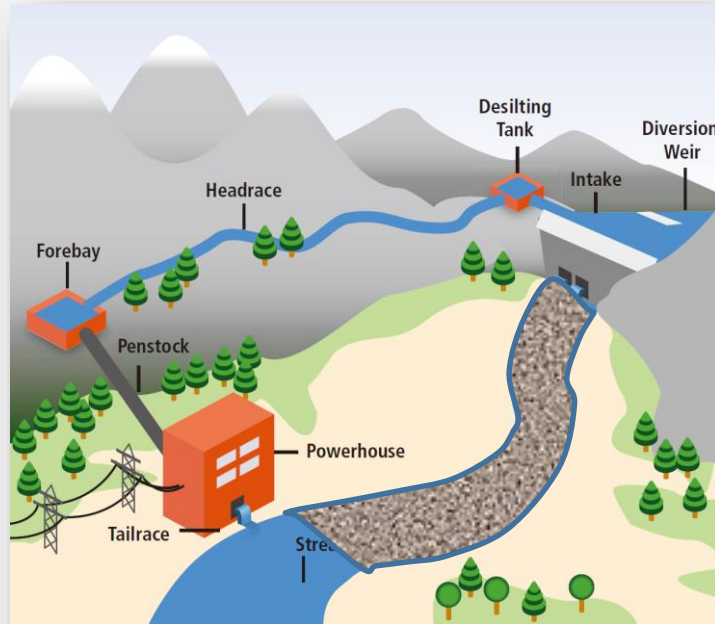


1. Background



1970s, China, rural electrification by SHP

1. Background

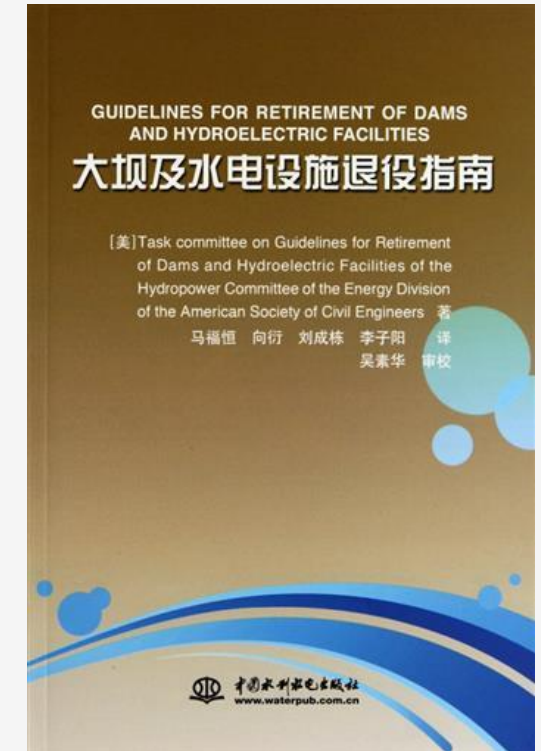
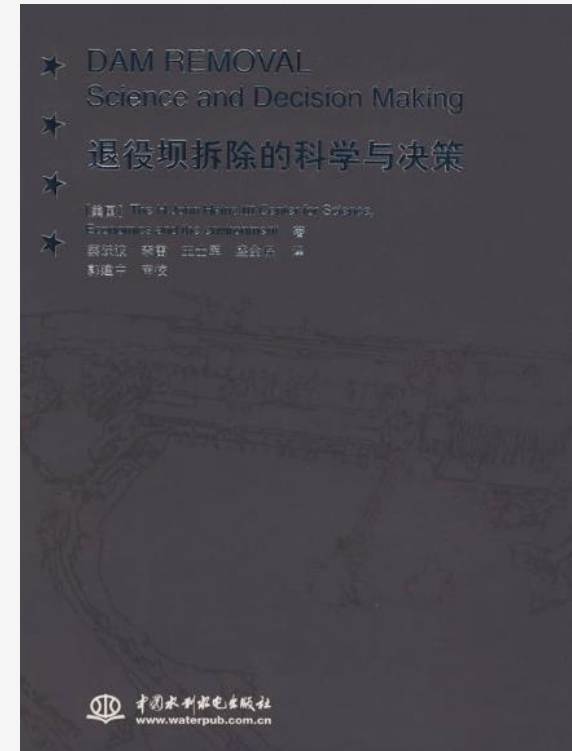


Environmental and Ecological impact of SHP

1. Background

The H. John Heinz III Center for Science, Economics and the Environment. **Dam removal: Science and decision making.**

Task Committee on Guidelines for Retirement of Dams and Hydroelectric Facilities of the Hydropower Committee of the Energy Division of the ASCE. **Guidelines for Retirement of Dams and Hydroelectric Facilities.**

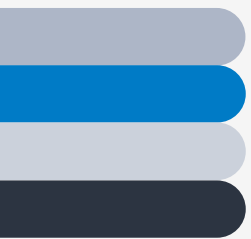


- Management Regulations of Reservoir Degrading and Removal(Trial) 2003 by MWR.
- Management regulations of SHP retirement by Zhejiang province water authority.
- Compensation standard for SHP retirement by Anji County water authority.



1. Background

- Restoration: facilities for Eflow discharge; ecological operation; retirement of SHP with **serious impacts in protected areas**.
- Legal issues: Recent years in China, some of the small hydropower (SHP) projects have been identified with serious ecological impacts on rivers especially for the projects **lack of EIA approval and the projects which have been developed in the protected Nature Reserves** after the Regulation on Nature Reserves taken effect in 1994.



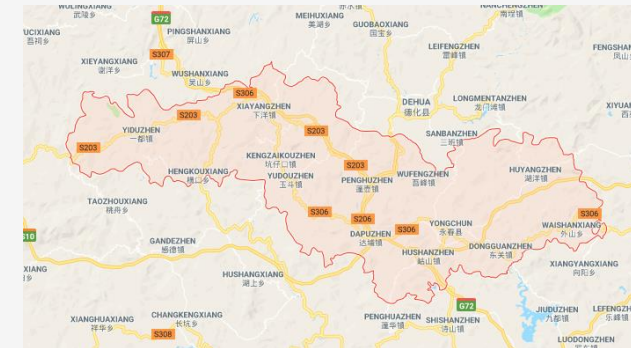
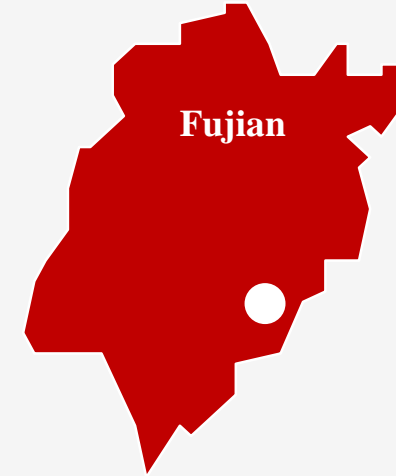
Cases

1. Case in Fujian

Fujian: has more than 6500 HPPs with total installed capacity up to 11.8GW in 2018.



China: 47000 SHP
##GW



Yongchun county:

1. Case in Fujian



SHP station retirement
14.10.2015

Cases in Fujian Province

1. Case in Fujian



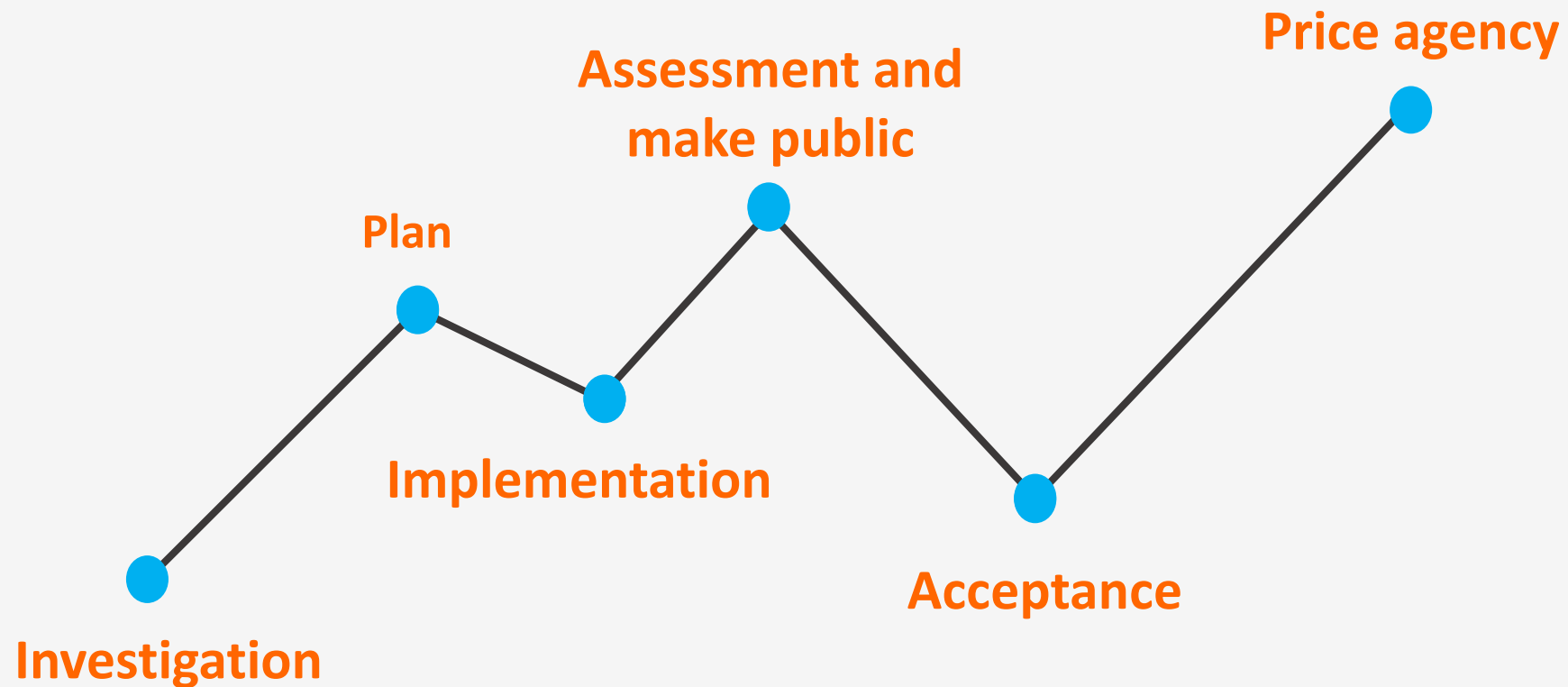
Retirement of diversion-type SHP station

1. Case in Fujian

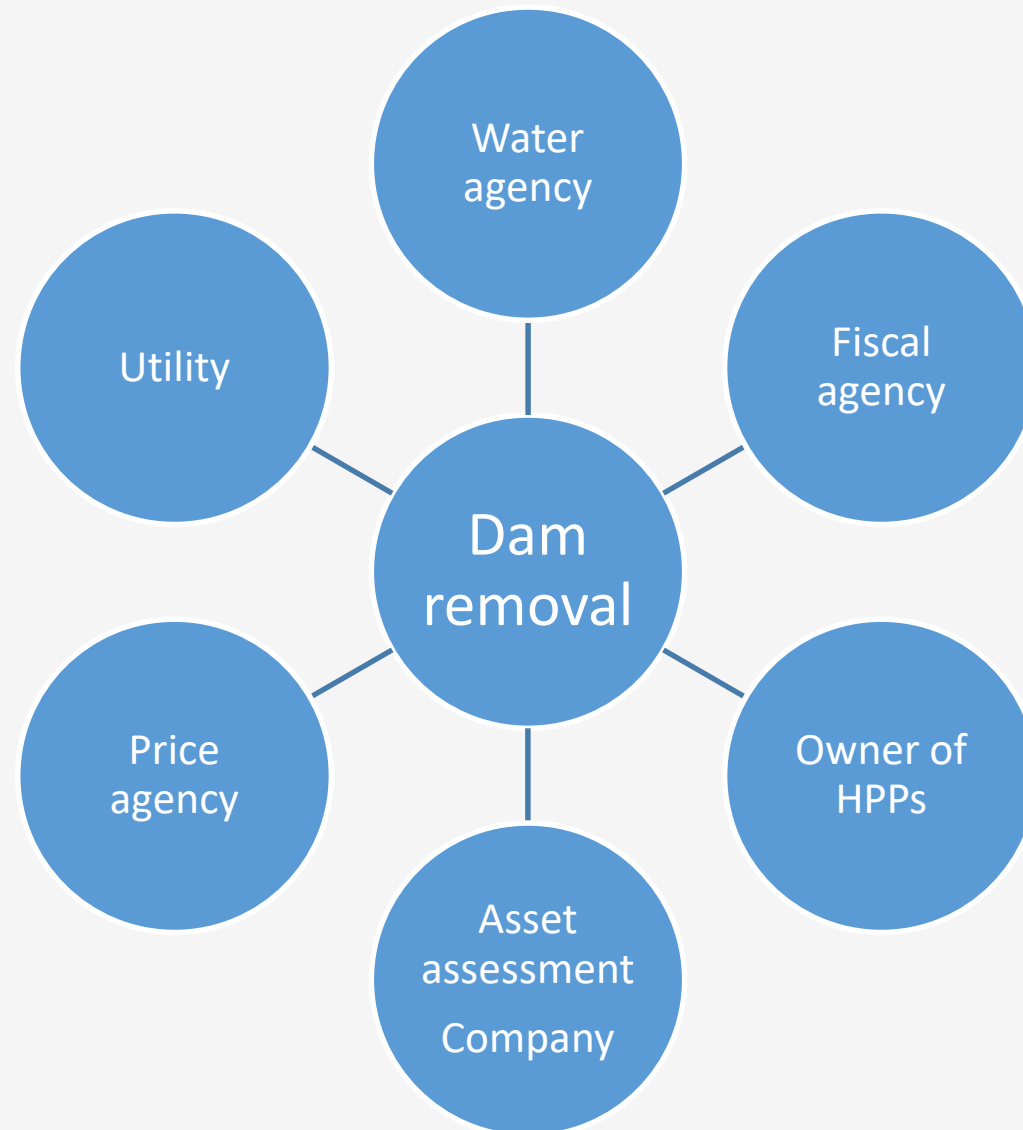


Retirement of SHP for drifting- tourism

1. Case in Fujian



1. Case in Fujian



Stakeholders

1. Case in Fujian

Time	Content	Stakeholders	Documents
March, 2015	Preliminary investigation	Water agency and fiscal agency of provincial, city and county level, owner of HPPs	Notice of Preliminary investigation
June, 2015	Implementation plan of retirement	County government, owner, related village delegates	Implementation plan of SHP retirement by Yongchun County government
2015.06~12	Implementation of removal	Owner, water agency of county, township government	Compensation contract of SHP removal
2015.11.13 ~19	Asset assessment and make public	Water agency and fiscal agency of Yongchun county, Mingcheng asset assessment company , owner	Public disclosure on the compensation assessment of retirement of 15 SHP projects
2015.12.24 ~25	Acceptance of the pilot work on SHP retirement	Water agency of province, city and county, owner	Comment for the Acceptance of the pilot work on SHP retirement
2016.01.13	Price agency's approval for ecological power tariff	Price agency of city and county	Price agency's approval for ecological price of the 3 SHPPs
2016.01.26	Implementation of the ecological power tariff	Price agency of count, electric utility of the county, owner	Notice of the ecological tariff of the 3 SHPPs by price agency of the county



SHP removal and restoration

In 2015, two counties start the pilot retirement of SHP projects in Fujian. Three categories of measures have been proposed depending on the complexity of different types of HPPs.

- 1) **Renovation**: targeting to the HPPs that are available to discharge the Eflow through rehabilitation and great than 200 kW.
- 2) **Limited operation**: if HPPs could not meet the Eflow requirement in dry season after the rehabilitation, these projects should reduce the diversion of water for power generation to ensure the Eflow discharge first.
- 3) **Retirement**: SHP projects should be recommended for retirement if the projects are **less than 200 kW**, located at the **core area and buffer area** of Nature Reserves, without approvals, with serious **safety risks** and unavailable for rectification, **decommissioned** for more than 3 years, failed to meet the **Eflow** requirement and without other benefits.

2. Rectification of SHP

- The Yangtze River Economic Belt (YREB) has a surface area of 2.1 million km², which includes 11 provinces from Yunnan and Sichuan in the west to Shanghai in the east. The YREB contributes over 40% of both the population and Gross Domestic Product (GDP) of China.



No: 24100/47000



2. Rectification of SHP

- Since January 2016, the Chinese government has begun emphasizing the ecological conservation in its development, especially after the remarks on Yangtze River proposed by **President Xi**, "to make all-out efforts to protect it, and **forbidding large-scale development of the river**". Development first was replaced by ecology first in Yangtze River after that. An ecological and environmental protection plan of the belt has been issued in 2017. The transformation also extended to SHP projects in Yangtze River.



2. Rectification of SHP

The National Audit Office (NAO) conducted an audit of 11 provinces and municipalities in the economic belt of Yangtze River between December 2017 and March 2018. In June 2018, the Environment Audit (EA) report indicates that:

- 1) The density of SHP development of some reach of the river is too high;
- 2) The newly installed capacity of SHP in 5 provinces exceeds the planned goals.
- 3) 930 HPPs in 8 provinces started the construction without the EIA permit;
- 4) 78 HPPs in 6 provinces have been developed within the protected areas even after the establishment of Nature Reserve.
- 5) 426 retired HPPs with barriers in 7 provinces have not been removed in time; 86% of 6661 HPPs with Eflow discharge facilities in 7 provinces have not realized the online monitoring;
- 6) Some reaches of 333 rivers have suffered from dewatering with total length up to 1017 km.

The publish of EA report uncovered various problems in Yangtze river basin which leads to follow-up special supervision and check on the approval, EIA and construction of SHP by several ministries.

Rectification of SHP

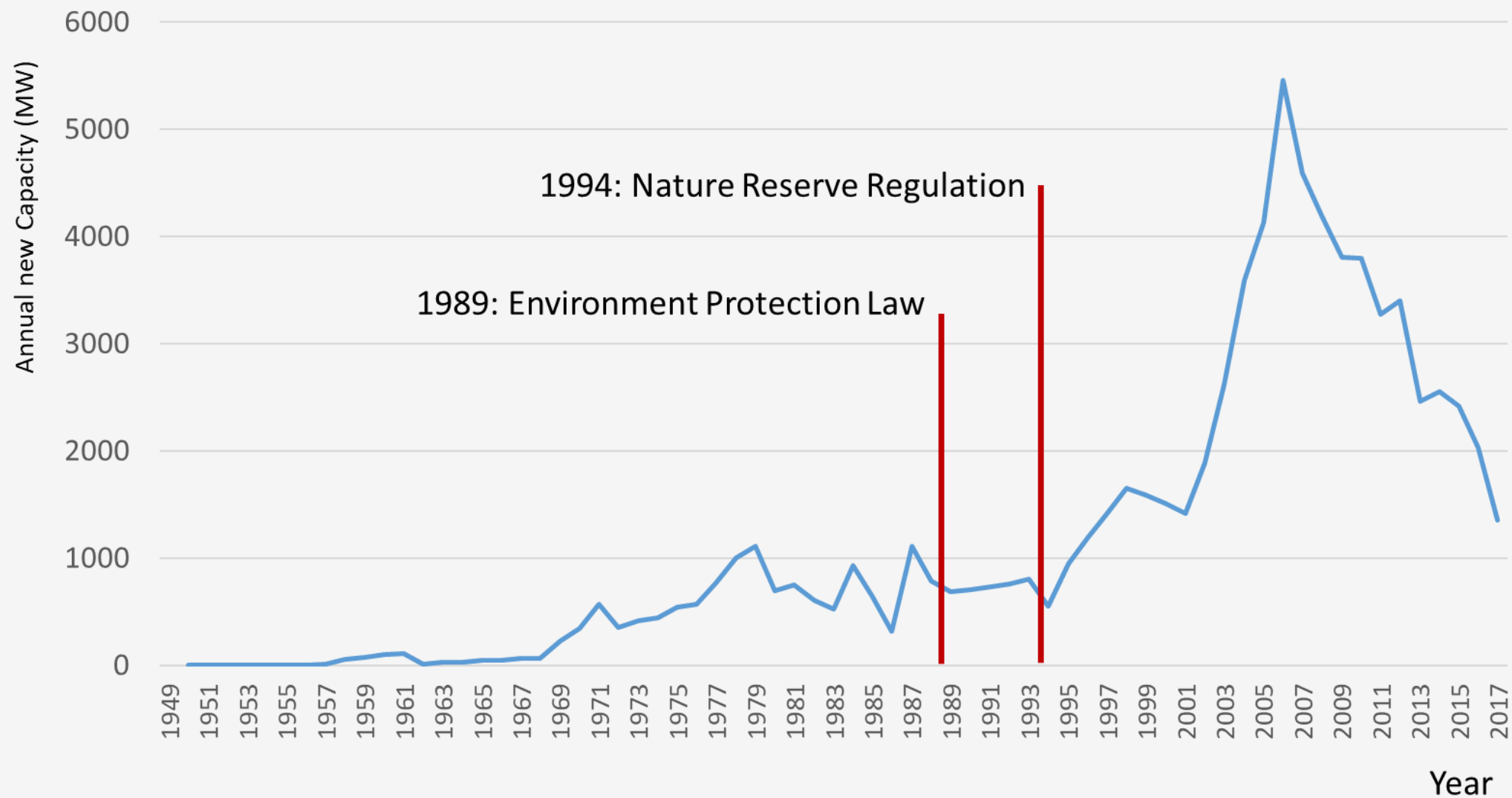


Figure 1. Annual new capacity addition of SHP in China (1949-2017)

Rectification of SHP

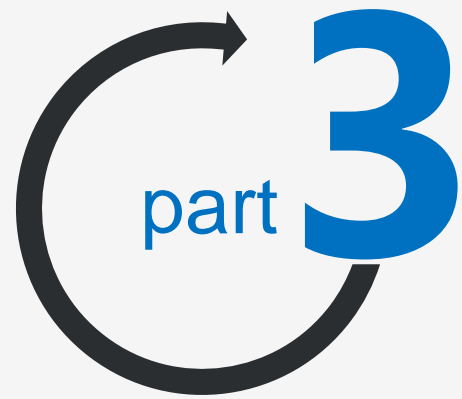
The rectification plan called for 7 HPPs under construction to stop and removal before the end of 2018 or 2019 with reasonable compensation by the local government, and all the 42 HPPs should meet the Eflow requirement in dry and wet season with online monitoring facilities (Table 1, Table 2).

Table 1. Number of SHP plants removal at Qianlian Mountain Nature Reserve

	Total	Core area	Buffer area	Transition area
Before	60	27	15	18
After	24	2	5	17

Table 2. Implementation plan of SHP plants removal at Qianlian Mountain Nature Reserve

Deadline	No. of SHP Retirement	Deadline	No. of SHP Retirement	Deadline	No. of SHP Retirement
12.2017	8	12.2019	4	12.2025	1
04.2018	4	12.2020	2	12.2028	4
12.2018	2	12.2021	2	12.2032	3



Summary



Summary

- Removal of small dam is one of the “byproduct” of retirement and restoration of SHP;
- The proportion is very small regarding to Number, MW; (1000 Fujian)
- Only small dam and SHP;
- Focus on dewatering, partly on barriers and fish migration;
- Pay attention to the **new** addition of dam for restoration and other purpose (tourism);
- Lack of data and guidelines for SHP removal (No AMBER);
- SHP still plays a significant role in renewable energy and rural development in China.



Thanks!

Zhenhua Cui

National Research Institute for Rural Electrification, China.

Hangzhou Regional Center (Asia-Pacific) for Small Hydro Power (HRC), China

E-mail: zhcui@hrcshp.org; 250191770@qq.com

Hudiksvall, Sweden

