



Crossing the River by Feeling the Stones: Institutional Lessons from China's Total Allowable Catch Pilots

Shu Su¹, Shiyu Zhang¹, Yi Tang¹, Yanxuedan Zhang¹, Chao Ma², Michael De Alessi³, Yong Chen⁴

1 College of Marine Living Resource Sciences and Management, Shanghai Ocean University, Shanghai, 201306, China

2 Fisheries Research Institute of Fujian, Xiamen 361013, China

3 School of Aquatic and Fishery Sciences, University of Washington, Box 355020, Seattle, WA, 98195, USA

4 School of Marine and Atmospheric Sciences, State University of New York at Stony Brook, Stony Brook, NY, USA

上海海洋大学
SHANGHAI OCEAN UNIVERSITY

Introduction

Effective fisheries management balances conservation and use. Total Allowable Catches (TACs) are a global standard for output control, helping reduce overfishing. As the world's largest fishing nation, China historically used input controls but began TAC pilots in 2017. This shift towards science-based governance faces challenges like limited data and enforcement. Analyzing China's experimental approach provides crucial lessons for implementing TACs in developing countries with complex socio-political settings.

Methodology

- (1) A review of national level policy trajectories using document analysis covering 68 documents
- (2) A review of 32 TAC pilot programs, supplemented by semi-structured interviews with 29 key informants
- (3) A questionnaire survey exploring perceived achievements and implementation challenges

Results

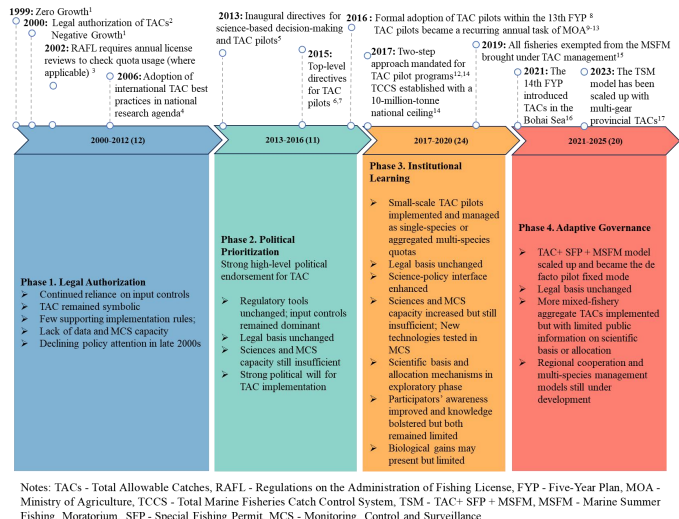


Figure 1. Key national policy releases, document counts, and stage-specific management features of TAC implementation in China (2000–2023).

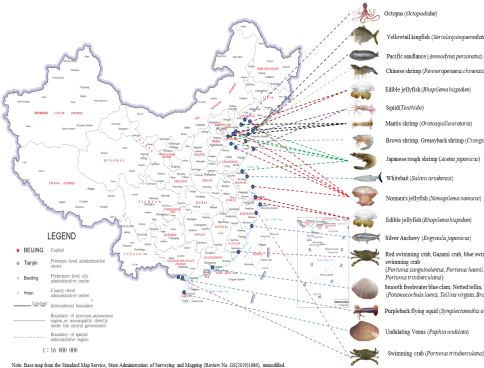


Figure 2. Distribution and target species of the 32 TAC Pilots

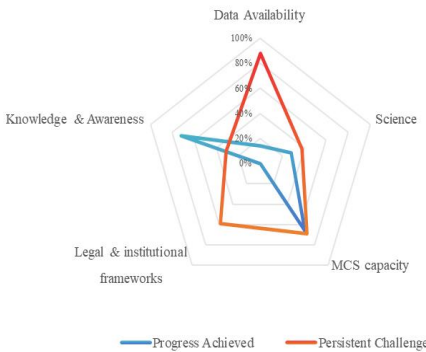


Figure 3. Experts' Perspectives on the Achievements and Challenges of TAC Implementation in China (2019)

Table 1. A summary of the 32 TAC pilots

Start Year	End Year	Province	Target Species	Scientific Name	Gear Types Allowed	Spatial Scope	Seasonal Scope	TAC Setting Method	Quota Allocation Method	SFP?	At-sea observer	Designated ports landings	VMS	Early warning mechanism	Fishing logbooks
2017	Active	SD	Edible jellyfish	<i>Rhizocorymba esculenta</i>	Drift net, Gill net	EPW	D	Avg. catch	CQ	Yes	Yes	Yes	Yes	Yes	Paper and electronic
2017	2018	ZJ	Swimming crab	<i>Paracentrotus lividus</i>	Gill net	DSA	Excl	Avg. catch	CQ	Yes	Yes	Yes	Yes	Yes	Paper and electronic
2018	2018	LN	Chinese shrimp	<i>Penaeus chinensis</i>	Gill net, Lift net	DSA	Excl	Avg. catch	IVQ	Yes	Yes	Yes	Yes	Yes	Paper
2018	2018	FJ	red swimming crab, Coconut crab, Blue swimming crab, and three-spot swimming crab	<i>Portunus sanguinolentus</i> , <i>Portunus asperatus</i> , <i>Portunus pelagicus</i> , <i>Portunus venustus</i>	Lift net	EPW	Excl	Avg. catch	Olympic	Yes*	NO	Designated but not implemented	No	Yes	Paper
2018	2018	GD	Smooth flounder, Yellow croaker, White-striped blue croaker	<i>Paralichthys oblongus</i> , <i>Lateolabrax laevis</i> , <i>Trachurus argenteus</i>	Bottom	EPW	Excl	Avg. catch	IVQ + Daily cap per boat	Yes*	NO	Yes	Yes	Yes	Paper and electronic
2019	Active	LN	Edible jellyfish	<i>Rhizocorymba esculenta</i>	Gill net	DSA	D	Avg. catch	IVQ	Yes	Yes	Yes	Yes	Yes	Paper
2019	Active	TJ	Edible jellyfish	<i>Rhizocorymba esculenta</i>	Gill net	EPW	D	Avg. catch	IVQ	Yes	Yes	Yes	Yes	Yes	Paper
2019	Active	HB	Edible jellyfish	<i>Rhizocorymba esculenta</i>	Gill net	DSA	D	Avg. catch	Olympic	Yes	Yes	Yes	Yes	Yes	Paper
2019	Active	ZJ	Edible jellyfish	<i>Rhizocorymba esculenta</i>	Set net	DSA	D	Avg. catch	Olympic	Yes	Yes	Yes	Yes	Yes	Paper
2019	Active	SH	Edible jellyfish	<i>Rhizocorymba esculenta</i>	Set net	DSA	D	Avg. catch	Olympic	Yes	Yes	Yes	Yes	Yes	Paper
2019	Active	JS	Nototheniid	<i>Notothenia aenariensis</i>	Stow net	DSA	D	Avg. catch	Olympic	Yes	Yes	Yes	Yes	TBD	Paper and electronic
2019	Active	ZJ	Silver anchovy	<i>Engraulis japonicus</i>	Two-chest bagged seine	DSA	D	Avg. catch	CQ	Yes	Yes	Yes	Yes	Yes	Paper and electronic
2020	Active	JS	Japanese rough shrimp	<i>Acanthopagurus</i>	Stow net	DSA	D	Avg. catch	IVQ	Yes	Yes	Yes	Yes	Yes	Paper
2020	2020	GX	Swimming crab	<i>Paracentrotus lividus</i>	Gill net	DSA	Excl	Avg. catch	IVQ	Yes	NO	Yes	Yes	Yes	Paper and electronic
2021	Active	LN	Japanese rough shrimp	<i>Acanthopagurus</i>	Stow net	DSA	D	Avg. catch	IVQ	Yes	Yes	Yes	Yes	Yes	Paper
2021	Active	SD	Japanese rough shrimp	<i>Acanthopagurus</i>	Stow net	DSA	D	Avg. catch	Olympic	Yes	Yes	Yes	Yes	Yes	Paper and electronic
2021	Active	LN	Mantis shrimp	<i>Stomatopoda</i>	Gill net	DSA	D	Avg. catch	IVQ	Yes	Yes	Yes	Yes	Yes	Paper
2021	Active	TJ	Mantis shrimp	<i>Stomatopoda</i>	Gill net	DSA	D	Avg. catch	IVQ	Yes	Yes	Yes	Yes	Yes	Paper
2021	Active	HB	Mantis shrimp	<i>Stomatopoda</i>	Gill net	DSA	D	Avg. catch	Olympic	Yes	Yes	Yes	Yes	Yes	Paper
2021	Active	SD	Squid	<i>Tenidoteuthis</i>	Gill net, Purse Seine, Trawl Net	DSA	D	Avg. catch	Olympic	Yes	Yes	Yes	Yes	Yes	Paper and electronic
2022	2022	SD	Brown shrimp, Grayback shrimp	<i>Penaeus chinensis</i> , <i>Callinectes</i>	Two-peg stow net	DSA	D	Avg. catch	Olympic	Yes	Yes	Yes	Yes	TBD	Paper and electronic
2022	2022	LN	Pacific sandfish	<i>Paralichthys ovirostris</i>	Light Seine, Two-board surface winged trawl	DSA	D	Avg. catch	CQ	Yes	TBD	Yes	TBD	NO	Paper
2022	2022	LN	Yellowtail kingfish	<i>Seriola lalandi</i>	Small hand seine	DSA	D	Avg. catch	CQ	Yes	TBD	Yes	TBD	NO	Paper
2023	2023	TJ	Japanese rough shrimp	<i>Acanthopagurus</i>	Stow net	DSA	D	Avg. catch	IVQ	Yes	NO	Yes	Yes	Yes	Paper
2023	Active	JS	Nototheniid	<i>Notothenia aenariensis</i>	Anchor-dredge net	DSA	D	Avg. catch	Olympic	Yes	Yes	Yes	Yes	Yes	Paper
2023	2023	LN	Octopus	<i>Octopoda</i>	Gill net	DSA	D	Avg. catch	IVQ	Yes	Yes	Yes	Yes	NO	Paper
2023	2024	GX	Purpleback flying squid	<i>Sepietta owstoniana</i>	Covering gear	DSA	D	Avg. catch	IVQ	Yes	Yes	Yes	Yes	Yes	Paper
2023	2024	HN	Undulating Veneer	<i>Pagrus auratus</i>	Raking gear	DSA	D	Avg. catch	IVQ	Yes	Yes	Yes	Yes	Yes	Paper
2023	Active	JS	Whitehead	<i>Astirola parvula</i>	Gill net	DSA	D	Avg. catch	Olympic	Yes	Yes	Yes	Yes	Yes	Paper
2024	Active	HB	Edible jellyfish	<i>Rhizocorymba esculenta</i>	Gill net	DSA	D	Avg. catch	Olympic	Yes	Yes	Yes	Yes	Yes	Paper
2025	Active	HB	Japanese rough shrimp	<i>Acanthopagurus</i>	Stow net	DSA	D	Avg. catch	Olympic	Yes	Yes	Yes	Yes	Yes	Paper
2025	Active	LN	Squid	<i>Tenidoteuthis</i>	Gill net, Purse Seine, Trawl Net	DSA	D	Avg. catch	Olympic	Yes	Yes	Yes	Yes	Yes	Paper

Note:
1. SD-Shandong; ZJ-Zhejiang; LN-Liaoning; TJ-Tianjing; GD-Guangdong; HB-Hebei; TJ-Tianjing; JS-Jiangsu; SH-Shanghai; GX-Guangxi; HN-Hainan; TBD-To be decided; EPW-Enter-Partial waters; DSA-Designated Sub-Area within the provincial waters; D-Designated certain days in marine summer fishing moratorium; Excl-excluding marine summer fishing moratorium; CO-Community Quota; IVQ - Individual Vessel Quota; Olympic-Free fishing like Olympic competition; Avg. catch - Average of previous certain years (3-5); TAC-Total Allowable Catch; SFP-Special Fishing Permit; VMS-Vessel Monitoring System
2. * - indicates fisheries that were converted from general license to Special fishing Permit regime

Note: 1. SD-Shandong, ZJ-Zhejiang, LN-Liaoning, FJ-Fujian, GD-Guangdong, HB-Hebei, TJ-Tianjin, JS-Jiangsu, SH-Shanghai, GX-Guangxi, HN-Hainan, TBD-To be decided, EPW-Entire provincial waters, DSA-Designated Sub-Area within the provincial waters, D-Designated certain days in marine summer fishing moratorium, Excl-excluding marine summer fishing moratorium, CQ-Community Quota, IVQ - Individual Vessel Quota, Olympic-Free fishing like Olympic competition, Avg. catch - Average of previous certain year (3-5), TAC-Total Allowable Catch, SFP-Summer Fishing Permit, VMS-Vessel Monitoring System
2. * - indicates fisheries that were converted from general license to Special Fishing Permit regime

Conclusion

Overall, our findings highlight that pilots can serve as a vehicle toward science-based and rights-based management, but without timely institutionalization of the lessons learned and emerging needs, they risk becoming entrenched as administrative routines rather than delivering sustainable ecological and economic outcomes.

Acknowledgements

We thank all individuals who generously shared their time and insights during interviews and surveys conducted for this research.

References

[1] Armitage, D., Berkes, F., & Doubleday, N. (Eds.). (2010). Adaptive co-management: collaboration, learning, and multi-level governance. UBC press.