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China's Water Renaissance: Conflict Resolution, Environmental Reform, and the Clean-Energy Transition in Contemporary China (2020–2025)

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Keywords: China; hydrology; renewable energy; environmental policy; conflict resolution; nuclear energy; solar power; water governance; ecological civilization; sustainability.

Abstract

Between 2020 and 2025, China accelerated one of the most rapid environmental governance transformations in the world. Anchored in the doctrine of ecological civilization, the country strengthened water-protection laws, restored degraded river systems, and expanded environmental monitoring while simultaneously executing the world's largest clean-energy transition. This paper integrates environmental governance, conflict-resolution theory, and energy-policy analysis to demonstrate how China's "water renaissance" is inseparable from its pivot away from hydropower dependence toward massive scale-up of solar, wind, and nuclear energy. Drawing on authoritative

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governmental sources, international organizations, academic literature, and major global news analyses (The Economist, Foreign Policy, World Bank, SCIO, MEE, and others), this article frames China's water reforms as a form of environmental peacebuilding—reducing structural water conflicts, rebalancing stakeholder incentives, and transforming energy-water-ecosystem relationships. The paper concludes with insights for policymakers pursuing integrated water and energy reforms under conditions of climate stress, population density, and industrial competition.

1. Introduction

China entered the 2020s facing severe environmental pressures: industrial pollution, rising water scarcity, loss of biodiversity, and historic tensions around river development. Seminal analyses such as The River Runs Black (Economy, 2010) and long-running "cancer village" investigations (Liu, 2010) documented structural failures in environmental enforcement that jeopardized public health and rural livelihoods.

Yet from 2020–2025, China underwent a profound transformation. Through the lens of conflict-resolution theory—including Ury's (2000) negotiation principles, Lederach's (2005) relational peacebuilding, and Delli Priscoli and Wolf's (2009) frameworks for cooperative water governance—China's reforms resemble a national-scale conflict-

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transformation process: institutional realignment, strengthened incentives, ecological restoration, and multi-level collaboration.

The parallel rise of non-hydropower clean energy—solar, wind, and nuclear—further reconfigured water-energy-ecosystem relations, easing hydrological stress and reducing conflicts traditionally associated with mega-dam development.

This paper synthesizes environmental, hydrological, and energy-transition developments between 2020–2025 to analyze China's "water renaissance" as a multidimensional process shaped by law, technology, ecological science, and conflict-resolution practices.

2. Environmental Progress (2020–2025)

China's Ministry of Ecology and Environment (MEE, 2024) reports significant water-quality improvements, with over 89% of monitored surface waters achieving Class I–III standards by 2023—exceeding 14th Five-Year Plan targets. Marine ecological protection also strengthened as detailed in the State Council Information Office's (SCIO, 2024) Marine Eco-Environmental Protection in China white paper, which expanded conservation areas, controlled land-based pollution, and restored coastal wetlands.

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The World Bank's China Economic Update – December 2024 highlights massive green-investment growth, including watershed restoration, pollution-control infrastructure, and nature-based solutions. These reflect a shift from reactive pollution control to proactive, basin-scale management strategies (World Bank, 2019, 2024).

Across river basins, China restored wetlands, removed or retrofitted small hydropower plants in ecological hotspots, and implemented ecological flow regimes to restore downstream fisheries—actions consistent with global best practices in water-conflict mitigation (World Bank, 2019).

3. Legal and Policy Frameworks

China's legal architecture for water protection experienced historic expansion.

3.1 Yangtze River Protection Law (2021)

The Yangtze River Protection Law—the first basin-specific statute in Chinese history—imposes strict controls on industrial siting, mandates ecological redlines, regulates toxic discharge, and compels cross-provincial coordination (FAOLEX, 2021; NPC Observer,

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2021; Reuters, 2020). It prohibits new chemical plants within a designated distance of the river, mandates risk assessments, and codifies stringent penalties for polluters.

3.2 Ecological Civilization and High-Quality Development

SCIO's China's Green Development in the New Era (2023) emphasizes the integration of environmental limits into state planning, performance evaluation, and public participation. Ecological civilization is framed not as a sectoral policy but as a guiding philosophy for development, demanding harmony between economic growth, social well-being, and environmental integrity.

3.3 Conflict-Resolution Framing

Legal clarity reduces uncertainty, narrows space for disputes, and creates predictable negotiation frameworks—a constitutional peace agreement between economy and environment (Ury, 2000; Delli Priscoli & Wolf, 2009). By clearly identifying ecological redlines, prohibited activities, and accountability mechanisms, the law functions as a conflict-prevention instrument, reducing opportunities for "race to the bottom" dynamics among local governments and industries.

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4. River Restoration and Water Governance Reform

World Bank (2019) recommendations—ecological compensation, watershed collaboration, monitoring, and adaptive governance—have been adopted across major basins. Examples include:

- Dam removals in ecologically sensitive tributaries.
- Riparian buffer expansions to reduce non-point source pollution.
- National parks such as Sanjiangyuan protecting headwaters of the Yangtze, Yellow, and Lancang rivers.
- Fish passage restoration in historically fragmented rivers.
- Upgrading of sewage treatment and rural wastewater management systems.

China's River Chief System (Jiang, 2023; Zhang et al., 2022) further institutionalizes accountability through a multi-level governance structure assigning each river segment a responsible official. This enables vertical and horizontal coordination and provides a point of contact for citizen grievances.

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Water governance is increasingly collaborative, transparent, and data-driven—traits aligned with conflict-resolution principles promoting dialogue, joint fact-finding, and shared problem-solving (Buckles, 1999).

5. Ecological Civilization and Public Participation

Public interest litigation has expanded dramatically, with NGOs and prosecutors filing thousands of environmental lawsuits annually. Citizens now participate in monitoring, river-patrol programs, and environmental education campaigns (Grano, 2016; MEE, 2024).

Lederach's (2005) "moral imagination" concept—creative peacebuilding rooted in relationships—offers a useful framework: China's ecological-civilization model seeks harmony among humans, economy, and nature, shifting societal norms toward long-term ecological stewardship. Environmental education, media coverage, and digital platforms for reporting pollution contribute to a culture where communities are increasingly empowered to defend their ecological rights.

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6. Conflict Resolution, Water Security, and Basin Cooperation

Basin commissions mediate inter-provincial water disputes, aligning incentives through ecological compensation, performance rankings, and joint-project financing. Internationally, China participates in hydrological data-sharing and disaster-risk-reduction networks, reducing uncertainty around shared rivers (Delli Priscoli & Wolf, 2009).

Adaptive governance—learning, feedback loops, cross-jurisdiction coordination—has emerged as a cornerstone of China's environmental conflict-transformation strategy (Li & Jin, 2023; Zhang & Chen, 2022). By embedding scientific monitoring, scenario planning, and stakeholder participation into water-management institutions, authorities are better able to respond to climate variability, extreme weather, and competing demands from agriculture, industry, and urbanization.

7. Redefining China's Energy Mix: From Hydropower Dependence to Renewable + Nuclear Diversification

A pivotal driver of China's water renaissance is the energy transition. Historically, hydropower played an outsized role in China's clean-energy strategy, creating tensions around environmental flows, community displacement, and ecosystem fragmentation.

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Large dams reshaped river systems and often imposed considerable social and ecological costs.

Between 2020–2025, however, China dramatically decreased reliance on hydropower expansion while scaling solar, wind, and nuclear energy.

7.1 Hydropower's Declining Marginal Role

Hydropower capacity reached roughly 436 GW in 2024, but annual growth slowed to around 3–4 percent (Climate Energy Finance, 2024). In contrast, solar and wind are expanding exponentially. The Economist notes that China's clean-energy revolution "will reshape global markets and politics" through unprecedented scaling of renewables (The Economist, 2025). With hydropower's major sites already developed and ecological costs increasingly scrutinized, China now emphasizes modernization over expansion:

- Retrofitting dams for efficiency and safety.
- Improving turbine technology and digital control systems.
- Developing pumped storage rather than new river-altering projects.
- Preserving ecological flows and prioritizing non-energy functions in some reservoirs.

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This transition reduces hydrological conflicts and opens opportunities for more flexible reservoir management. It suggests a rebalancing of roles: instead of hydropower being the dominant clean-energy pillar, it becomes part of a diversified portfolio supporting grid stability.

7.2 Solar and Wind: Unprecedented Global Scale

China added more than 260 GW of solar and wind in 2024–2025 alone—greater than the entire renewable capacity of many developed economies (Centre for Research on Energy and Clean Air [CREA], 2025). Key milestones include:

- Approximately 887 GW of solar capacity by late 2024.
- Roughly 1,482 GW combined wind and solar by early 2025, surpassing coal capacity.
- Manufacturing dominance: China produces around 80 percent of global solar panels and 60 percent of wind turbines (Electrek, 2025).

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Environmental implications are significant:

• Dramatically lower consumptive water use compared to conventional thermal power and reservoir-based hydropower.

• Reduced pressure to construct new mega-dams in ecologically sensitive regions.

• Increased flexibility in river management, as electricity generation is less tied to reservoir releases.

• Alleviation of hydro-electricity conflicts during drought cycles.

Foreign Policy (2025) reports that China's renewable surge is already reducing coal plant utilization, accelerating emissions peaking and reinforcing global climate leadership. This reconfiguration of the power system helps delink economic growth from both carbon intensity and water-intensive energy pathways.

7.3 The Rise of Nuclear: Low-Carbon Baseload Without Hydrological Strain

China also leads the world in nuclear plant construction. Official reports note that 11 new nuclear reactors were added in 2024 and that roughly 113 GW of nuclear capacity is now in operation or under construction (China Daily, 2025). Policy forecasts suggest that

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nuclear could account for about 10 percent of China's power generation by 2035 and 18 percent by 2060 (China Daily, 2024).

Nuclear energy offers several benefits for water governance and conflict mitigation:

• It provides stable baseload power independent of river flow variability.

• It reduces reliance on hydropeaking, which can cause dramatic intra-daily changes in river levels downstream of dams.

• It allows reservoirs to shift toward ecological and social priorities, such as maintaining environmental flows, supporting fisheries, and reducing flood risk.

While nuclear plants do require cooling water, many Chinese units are coastal, reducing pressure on inland freshwater systems. Nevertheless, climate adaptation plans must address thermal discharge and potential vulnerabilities under marine heatwaves and sea-level rise.

7.4 Integrated Water–Energy–Ecosystem Transformation

This clean-energy shift fundamentally alters China's environmental conflict landscape.

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I. Reduced New Dam Construction Pressure

Fewer mega-dams mean fewer community relocations, fewer ecological disruptions, and less contestation around dam siting and compensation. Where new projects proceed, they increasingly incorporate environmental flow provisions and social safeguards.

II. More Flexible Reservoir Operation

As solar, wind, and nuclear provide a greater share of electricity, hydropower can focus on balancing and peak-shaving services. This complements pumped-storage growth and smart-grid development (Climate Energy Finance, 2024). Reservoirs are less compelled to maximize annual generation at the expense of ecological and social objectives.

III. Expanded Ecological Flow Possibilities

Rivers can operate more naturally without sacrificing energy security. Environmental flow regimes can be designed to support fish migration, sediment transport, and wetland health—integral to long-term water security and biodiversity.

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IV. New Governance Actors and Polycentric Networks

Solar developers, grid operators, storage firms, and nuclear regulators enter the water–energy nexus. Relational governance must now coordinate a wider range of actors with diverse interests and technical languages. This polycentric configuration can spur innovation but also requires sophisticated conflict-resolution mechanisms.

V. Enhanced Climate Resilience

Lower hydropower dependence protects the energy grid from drought shocks and variable monsoon dynamics worsened by climate change. Diversified clean-energy portfolios reduce systemic risk while maintaining progress toward carbon-neutrality goals.

8. Synthesis: China's Water Renaissance as Environmental Peacebuilding

China's environmental reforms between 2020–2025 reveal a distinct pattern:

• Legal stabilization reduces conflict triggers by clarifying rights, responsibilities, and penalties.

• Energy diversification reduces hydrological dependence and eases pressure on rivers.

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• Restoration and protection reduce ecological grievances and rehabilitate damaged ecosystems.

• Citizen participation increases accountability and strengthens social legitimacy.

• Cross-jurisdiction cooperation builds trust, data-sharing, and joint solutions.

• Technological innovation—renewables plus nuclear—lifts pressure from rivers while aligning with global climate commitments.

This aligns with Lederach's (2005) relational peacebuilding: reconciling human needs, institutional change, and ecological balance. In Buckles' (1999) terms, China is attempting to "cultivate peace" in natural-resource management by embedding collaboration and long-term stewardship into law, planning, and practice.

China's experience offers a transferable governance toolkit for nations facing water scarcity, pollution, and energy transition challenges. While political, cultural, and institutional contexts differ, core lessons about basin-scale law, ecological redlines, public participation, and energy diversification can inspire adaptation elsewhere.

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9. Conclusion

China's "water renaissance" is not a singular environmental policy but a comprehensive transformation involving law, technology, governance, and negotiation. The shift from hydropower dependence toward solar, wind, and nuclear energy stands as one of the most consequential global developments of the decade, reshaping water-energy interactions and reducing conflict around dams and river development.

Through ecological civilization, adaptive governance, and the clean-energy transition, China demonstrates how environmental health, human security, and national development can converge into a model of environmental peacebuilding. The coming decade will test whether this model can continue expanding and whether it can inspire other nations confronting similar pressures.

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