



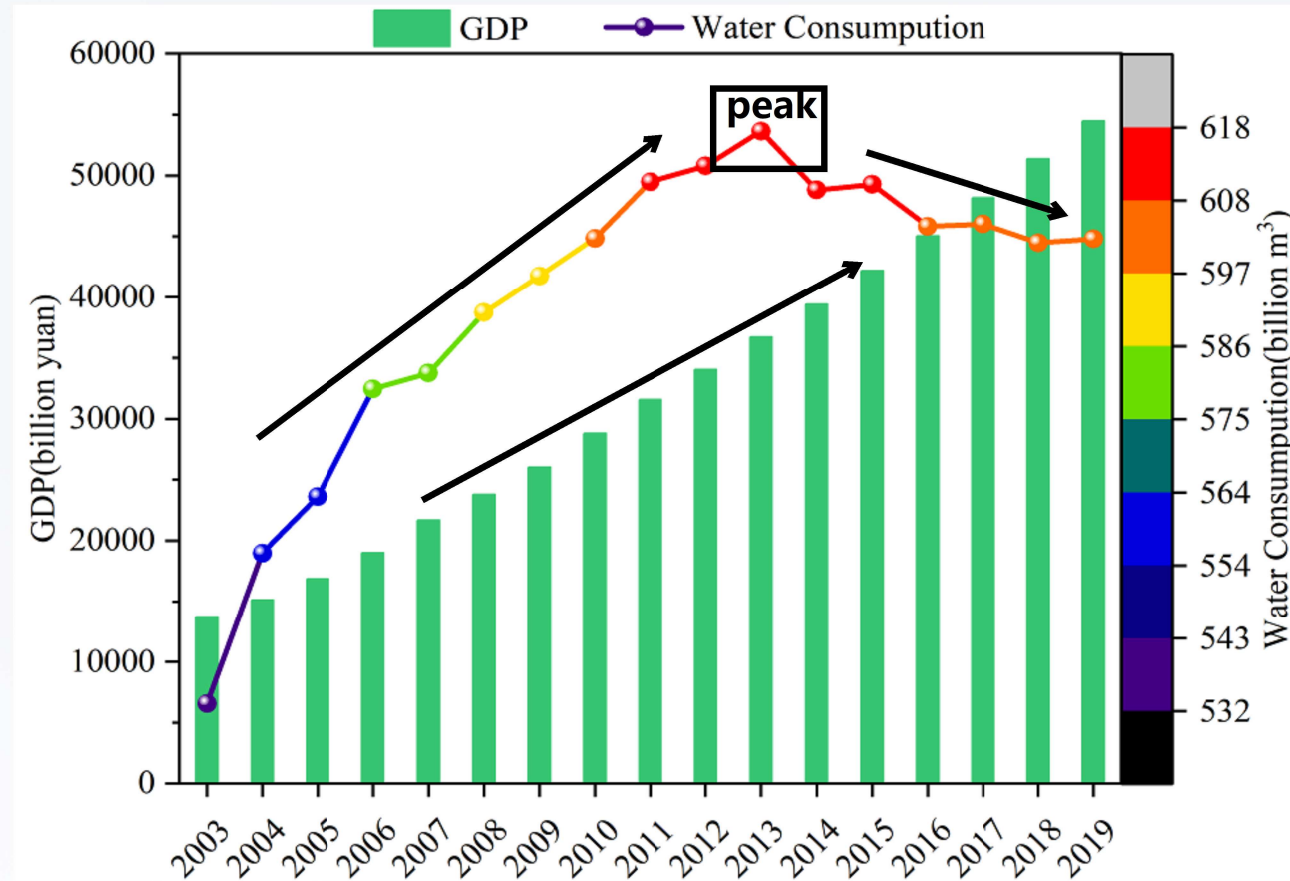
The relationship between water consumption and economic growth in China

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Content

- **The change of GDP and water consumption**
- **Decoupling analysis**
- **Decomposition analysis**
- **Conclusions**

GDP and Water consumption in China from 2003 to 2019



GDP: 13742.2 \longrightarrow 54469.8 billion yuan

(an increase of 40727.6 billion yuan, **8.44%**)

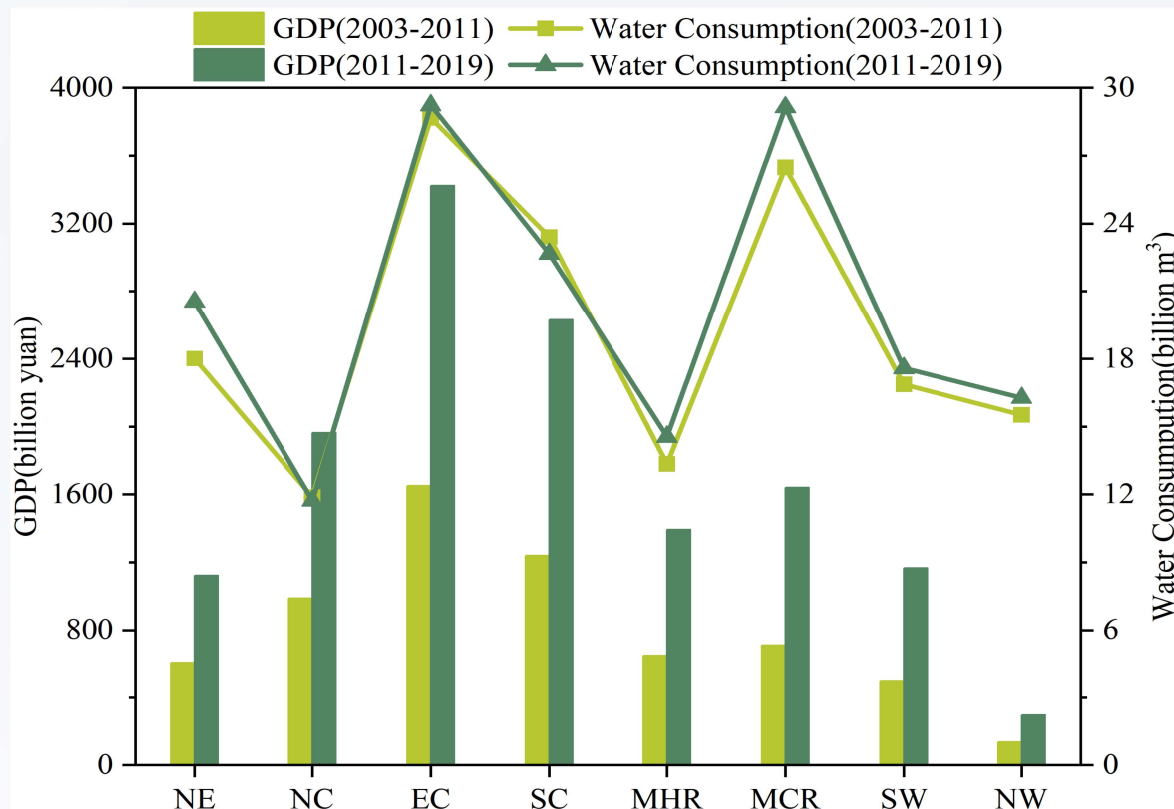
Water consumption: 532.04 \longrightarrow 602.12 billion m³

(a rise of 70.08 billion m³, **0.73%**)

The water consumption peak: 618.34 billion m³
in **2013**

(a negative growth trend after 2013 , **-0.38%**)

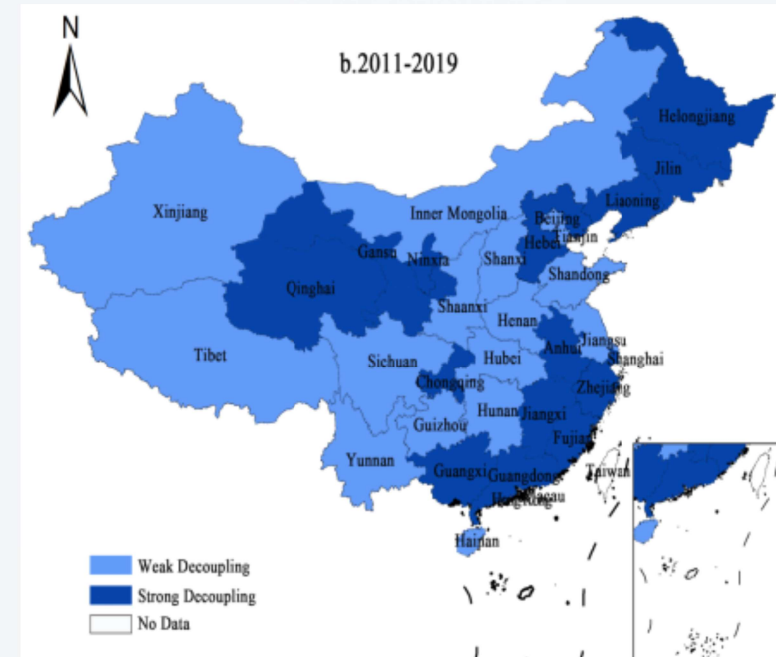
GDP and Water consumption in 8 economic regions in two stages



GDP: in 2003-2011 was **higher** than that in 2011-2019
Water consumption: changed **relatively little**.
In general, the annual average GDP and water consumption in two stages **varied considerably** among regions, and the ranking of GDP was **inconsistent** with that of water consumption.

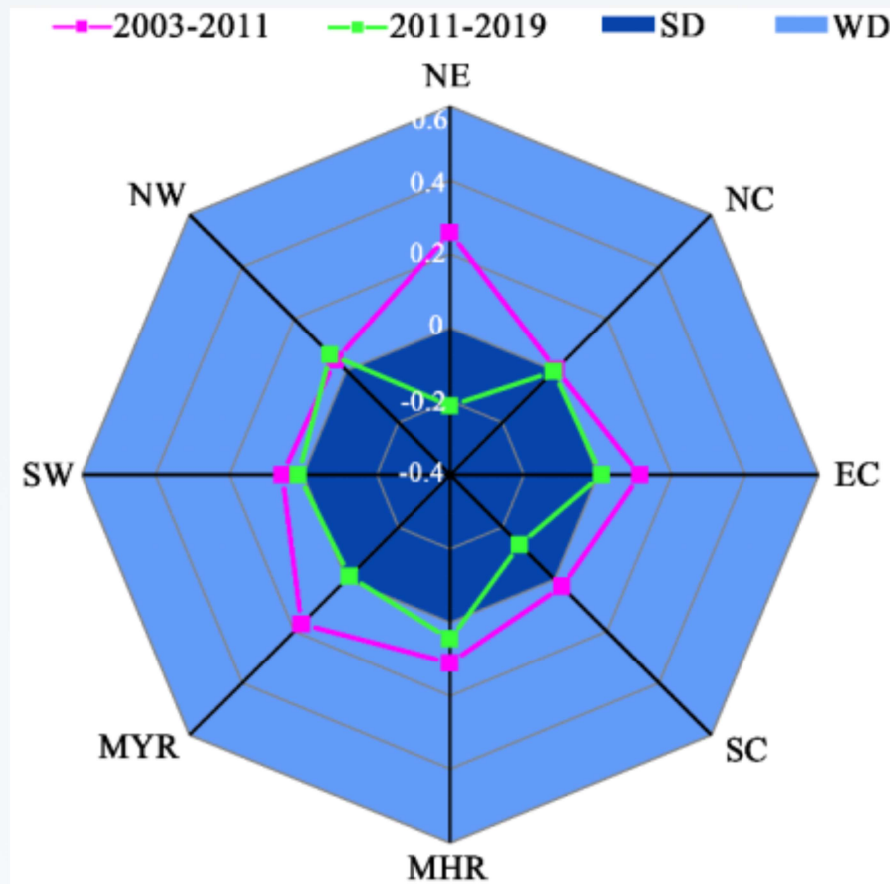
Economically developed locations may not necessarily have high water consumption!

Decoupling states in 31 provinces in two stages



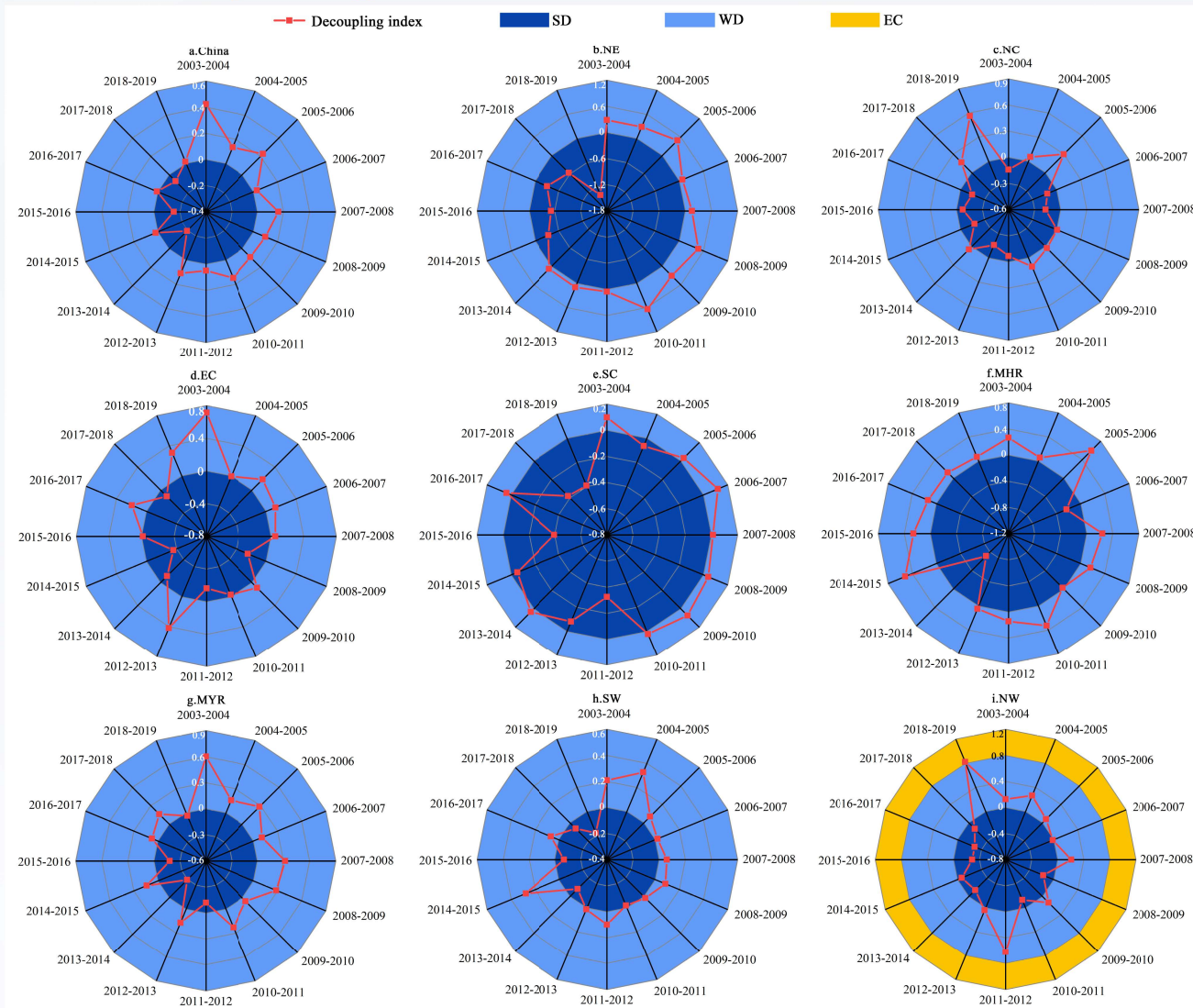
- 31 provinces **achieved the decoupling state** of water consumption from economic growth in both stages.
- In the first stage, **3 provinces** had negative decoupling index values, reaching **SD** states.
- In the second stage, there are **15 provinces** with the state of **SD**, and the remaining **16 provinces** were **WD**.
- In general, the decoupling index **decreased from the first stage to the second stage**, and **the decoupling effect in the second stage was superior to the first stage**.

Decoupling states in 8 economic regions in two stages



- 8 economic regions had **all achieved decoupling**.
- In the first stage, all regions had a weak decoupling (**WD**) state. The decoupling index is **the highest in NE and the lowest in NC**.
- In the second stage, except for NW, the decoupling index values of other regions decreased compared to the former, **and the decoupling states were better than that in the first stage**.

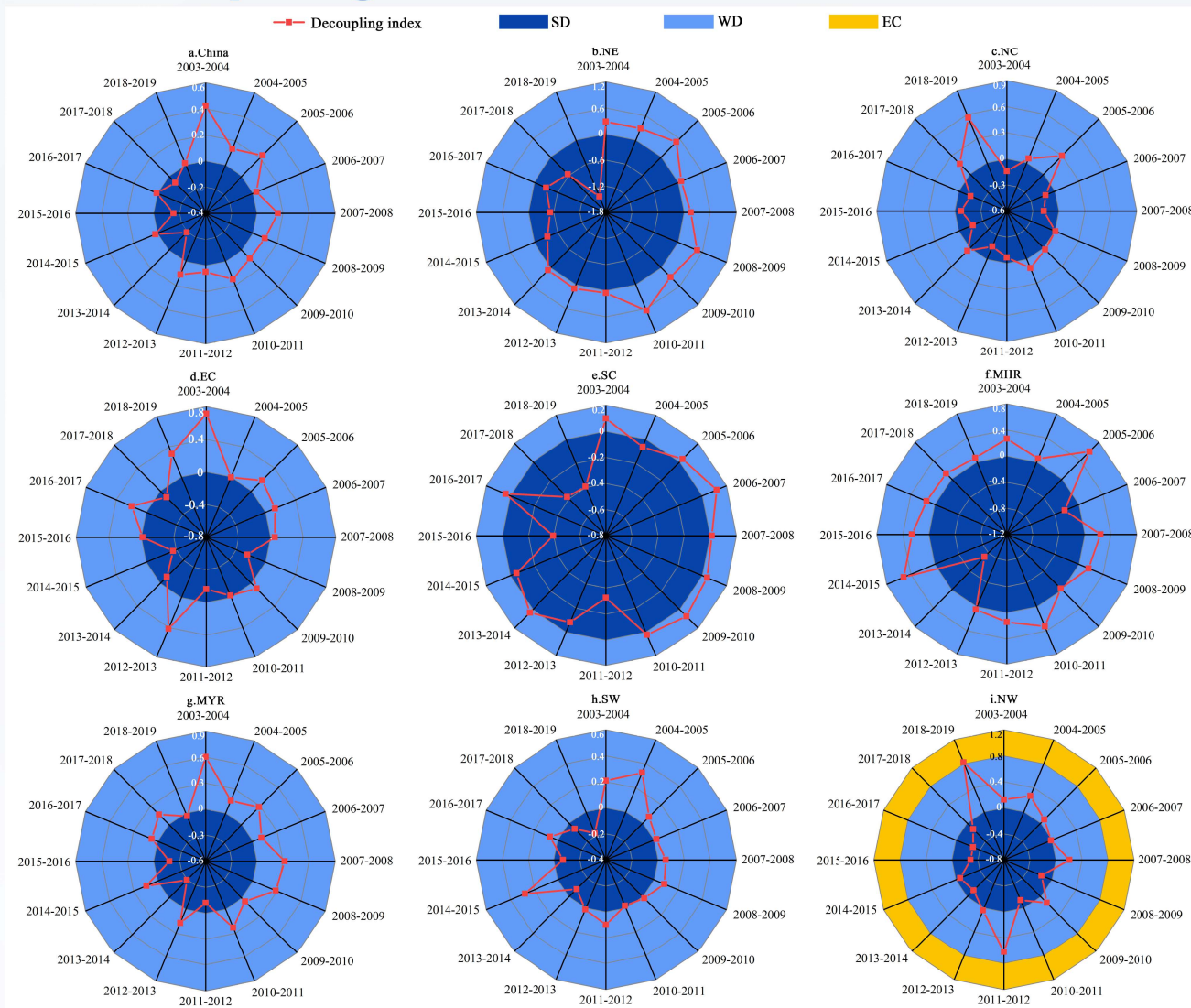
Decoupling states in China and 8 economic regions from 2003 to 2019



a.China: There were two decoupling states, weak decoupling(WD) and strong decoupling(SD), and the decoupling index revealed **a tendency toward decline.**

Before 2013, the decoupling states were **WD.**
After 2013, **WD and SD** appeared alternately.
In 2013, the State Council conducted an assessment on the implementation of **the strictest water resources management system.**

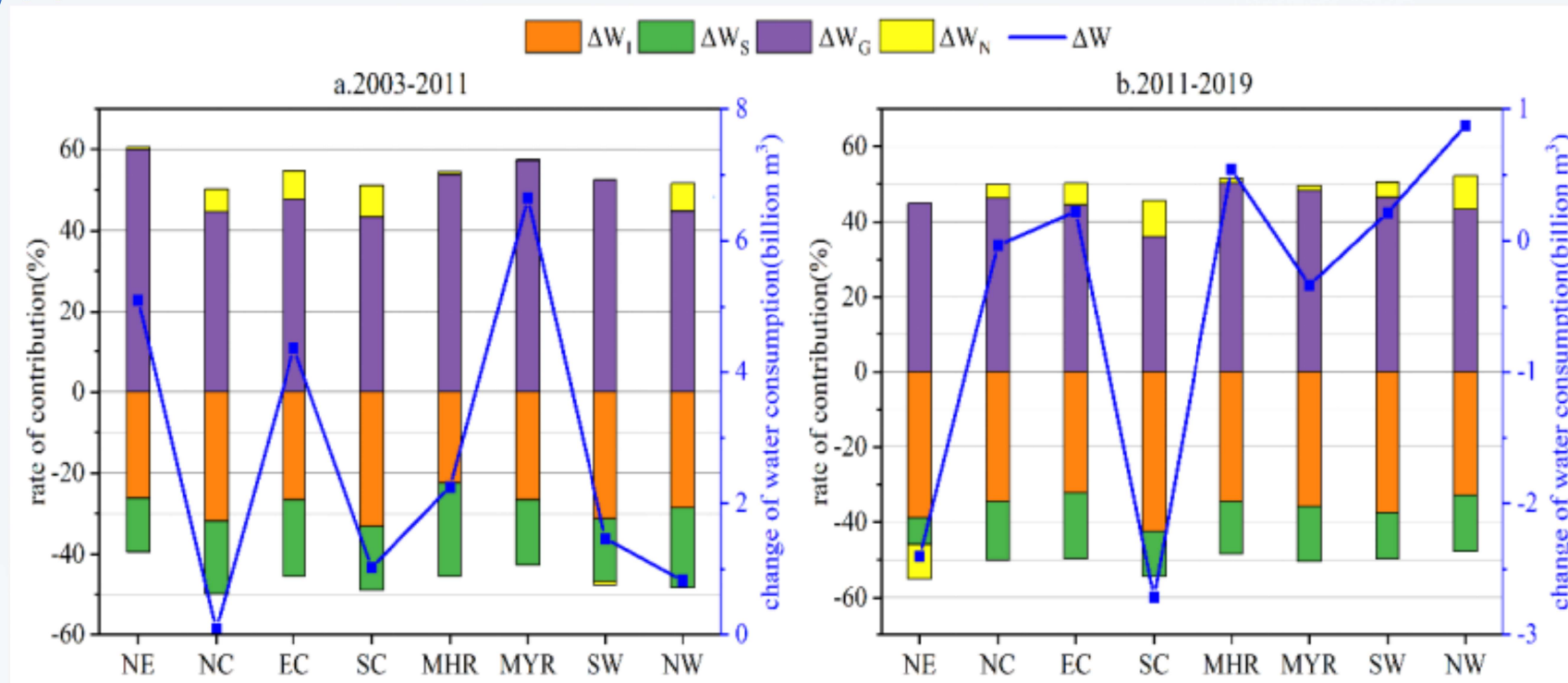
Decoupling states in China and 8 economic regions from 2003 to 2019



b-i. 8 economic regions: NW showed an **EC** state in 2008-2009, while other regions presented only **SD and WD**.

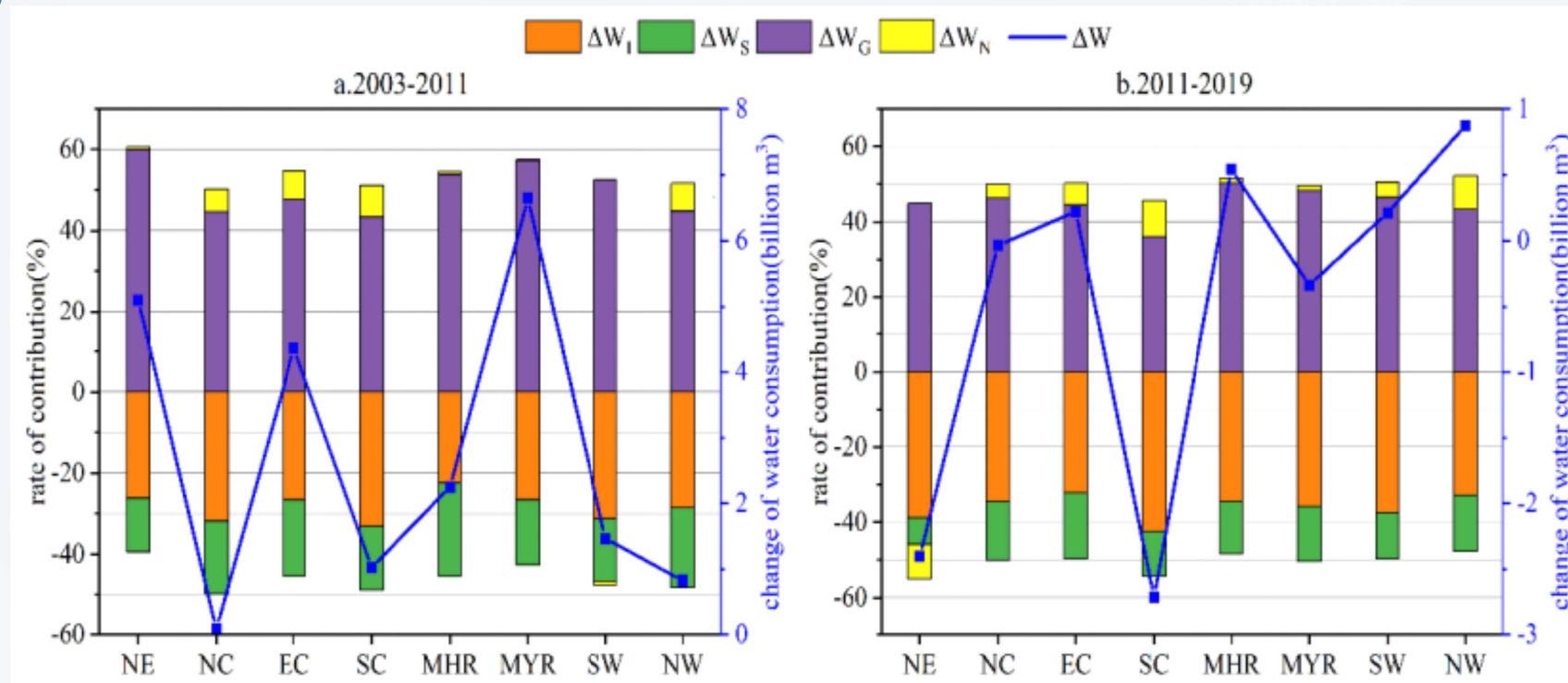
In general, the **three coastal regions** had better performance, with more occurrence of **SD**.

Effects Decomposition of water consumption in 8 economic regions in two stages



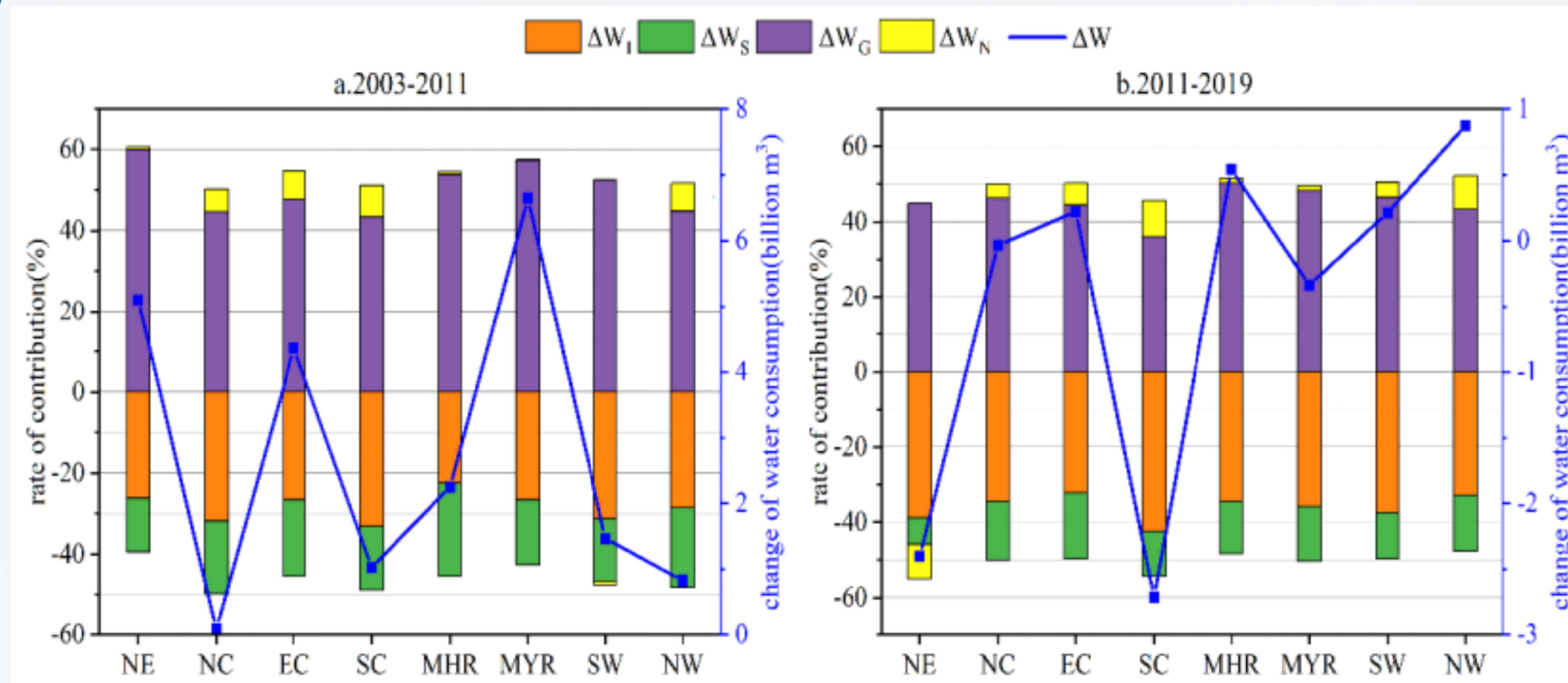
- In the first stage, the cumulative effects of **all regions were positive**, among which **MYR had the most considerable cumulative effect** and was also the main region causing the cumulative increase in China's water consumption. **NC, SC, SW, and NW had relatively little influence** on water consumption in China, especially in NC, where the cumulative positive effect on water consumption was negligible.

Effects Decomposition of water consumption in 8 economic regions in two stages



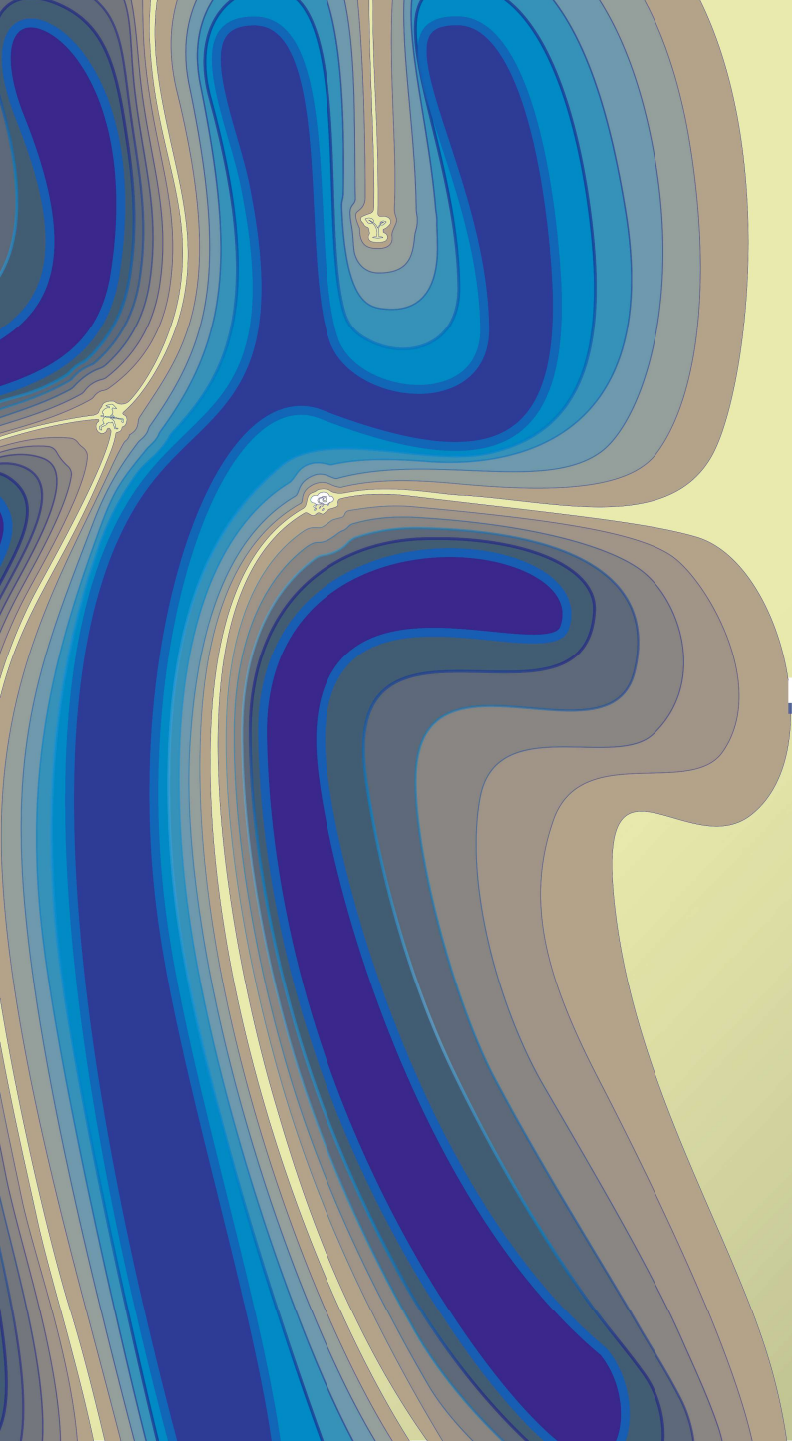
- In the second stage, the cumulative effects of NE, NC, SC, and MYR changed **from positive to negative**.
- In general, regional water consumption decreased and moved in the direction of water conservation. It was attributed to the State Council further clarifying to "**accelerate the construction of a water-saving society**" in 2011.

Effects Decomposition of water consumption in 8 economic regions in two stages



- **the water use efficiency effect and economic growth effect** were **the key driving factors** of water consumption changes.
- **The water use efficiency effect and the industrial structure effect** contributed to the **reduction** of water use, **the economic growth effect inhibited it**, and the contribution of the **population effect was small**.

- The total water consumption in China experienced a transition from WD to SD. In 2003-2011, most of the 31 provinces were in a WD state, and only 3 reached SD. In 2011-2019, the number of provinces achieving an SD state increased significantly, and the overall decoupling effect became better. In 8 economic regions, the decoupling state in NW deteriorated in the second stage, the remaining regions' decoupling states improved, and NE, NC, SC, and MYR showed SD states.
- Water use efficiency and economic development effects were the most important factors promoting and hindering decoupling, respectively, followed by industrial structure effect, and population effect had the least contribution. In general, from the first stage to the second stage, the positive effect of water use efficiency on water consumption reduction tended to increase, and the positive effect of industrial structure and the negative effect of economic development tended to decrease. Water consumption at the national, provincial, and regional levels was decreasing and moving towards water conservation.



Thank you !