Water Resources of Megacities:
Virtual water flows and food consumption economies

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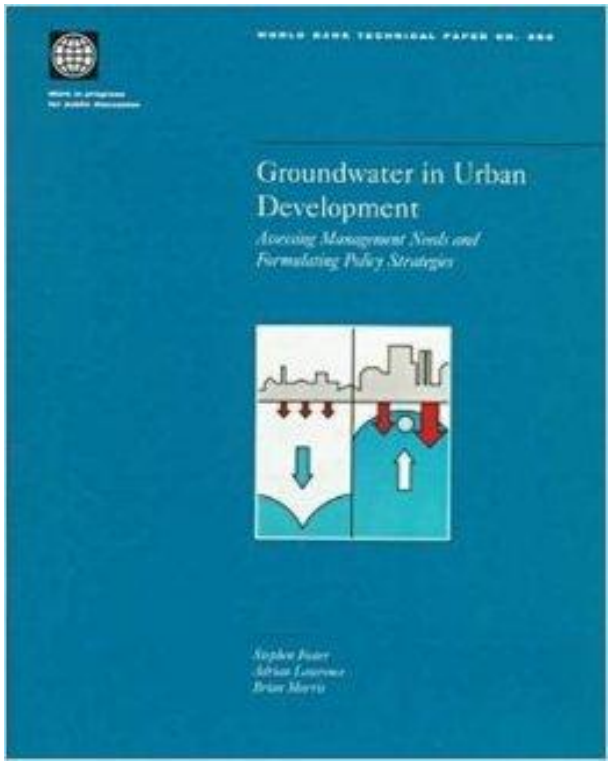
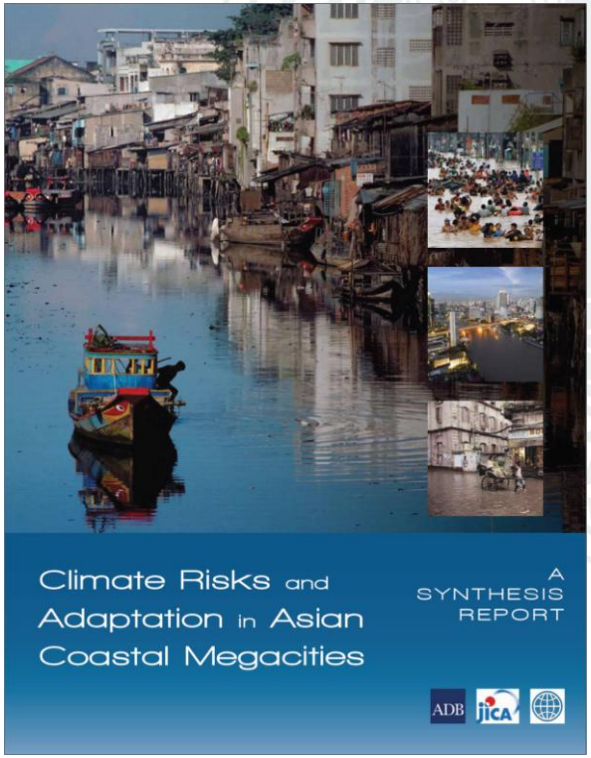
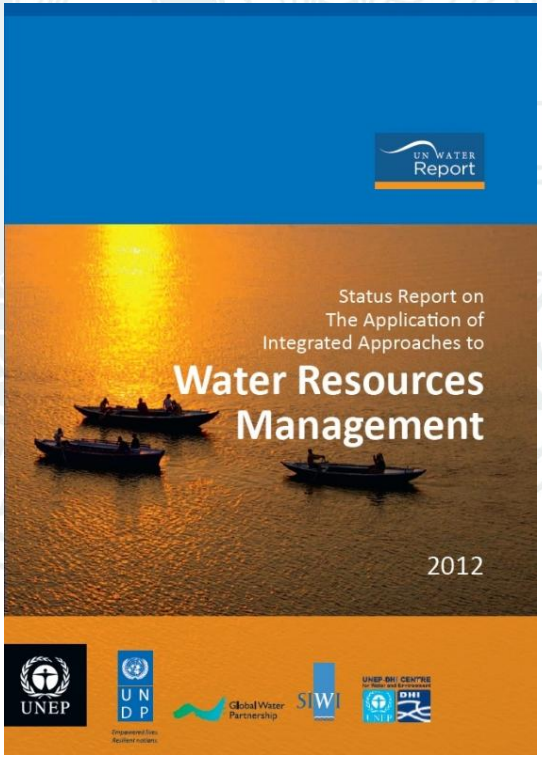
Water Resources of Megacities







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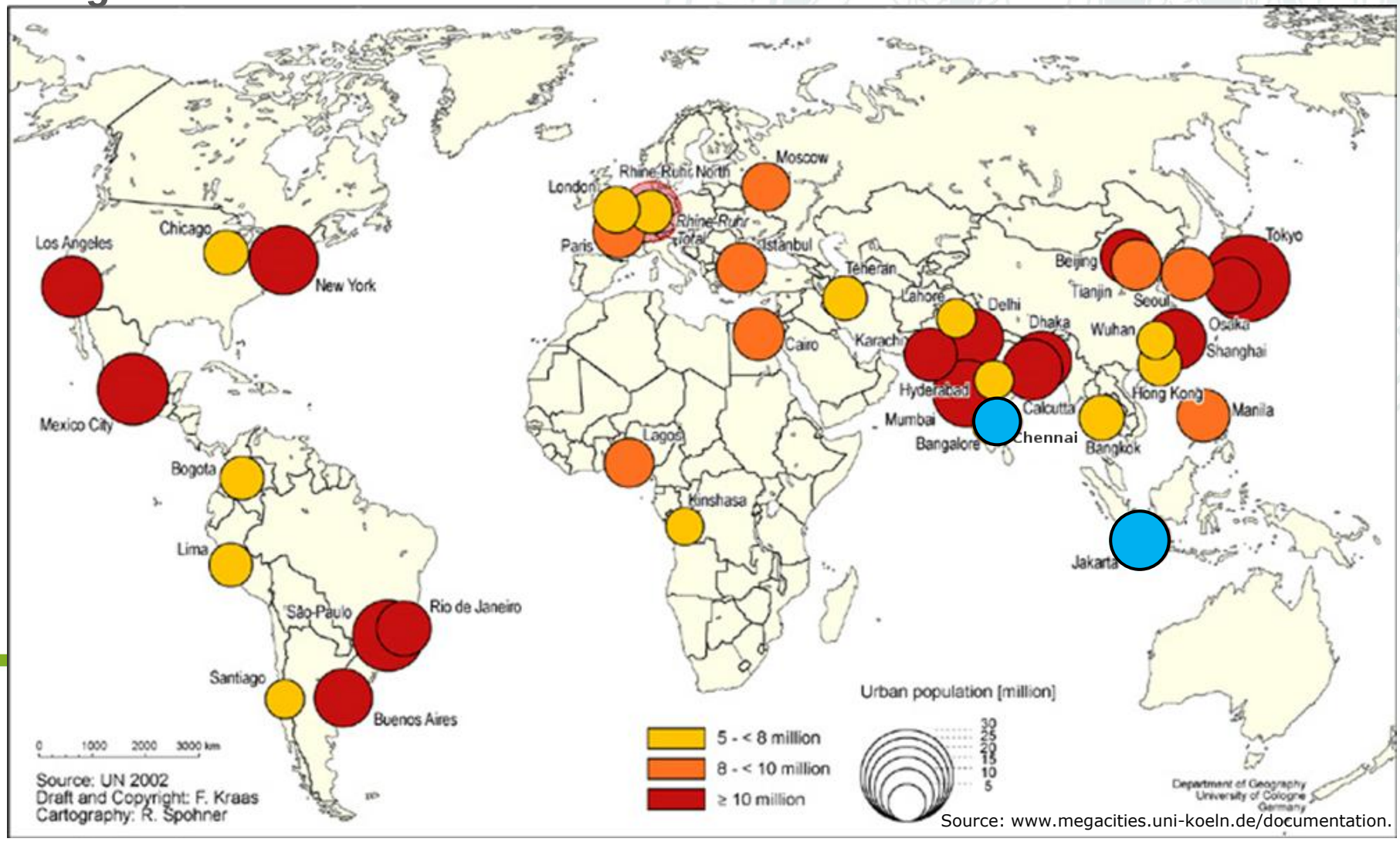
Study areas

Megacities in 2000



Source: www.megacities.uni-koeln.de/documentation.

Jakarta

- **Second most vulnerable city to climate change** (WWF 2009)
- **Water consumption: 77.6 liter/day/capita**
- **Access to sanitation: 67 %**
- **Share of wastewater treated: 1 %** (Asia Green City Index 2010)

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Literature review

- **Jakarta:**
  - **Water supply and urban poor**
    (Bakker et al. 2007; Chatterjee 2010)
  - **Urban water pollution**
    (Schouten/Halim 2010; Onodera et al. 2008)
  - **Urban water governance**
    (Asian Green City Index 2010, WWF 2009, Foster 2001)
  - **Virtual water flows of Indonesian provinces**
    (Bulsink et al. 2010)

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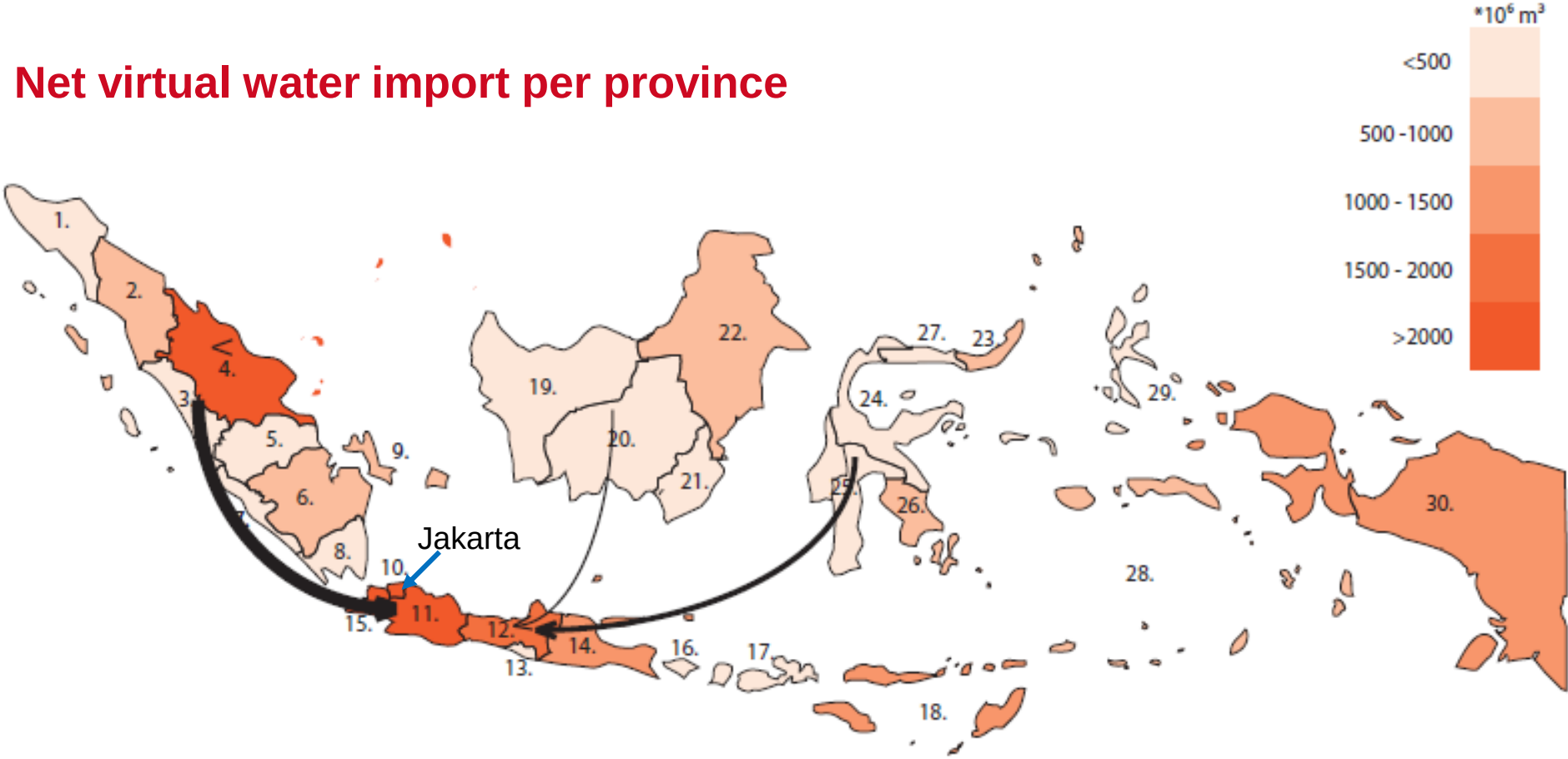
Net virtual water import per province



Indonesia

1. Nanggroe Aceh D.
2. Sumatera Utara
3. Sumatera Barat
4. Riau
5. Jambi
6. Sumatera Selatan
7. Bengkulu
8. Lampung
9. Bangka Belitung
10. D.K.I. Jakarta
11. Java Barat
12. Java Tengah
13. D.I. Yogyakarta
14. Java Timur
15. Banten
16. Bali
17. Nusa Tenggara Barat
18. Nusa Tenggara Timur
19. Kalimantan Barat
20. Kalimantan Tengah
21. Kalimantan Selatan
22. Kalimantan Timur
23. Sulawesi Utara
24. Sulawesi Tengah
25. Sulawesi Selatan
26. Sulawesi Tenggara
27. Gorontalo
28. Maluku
29. Maluku Utara
30. Papua

Bulsink et al. 2010, 122.

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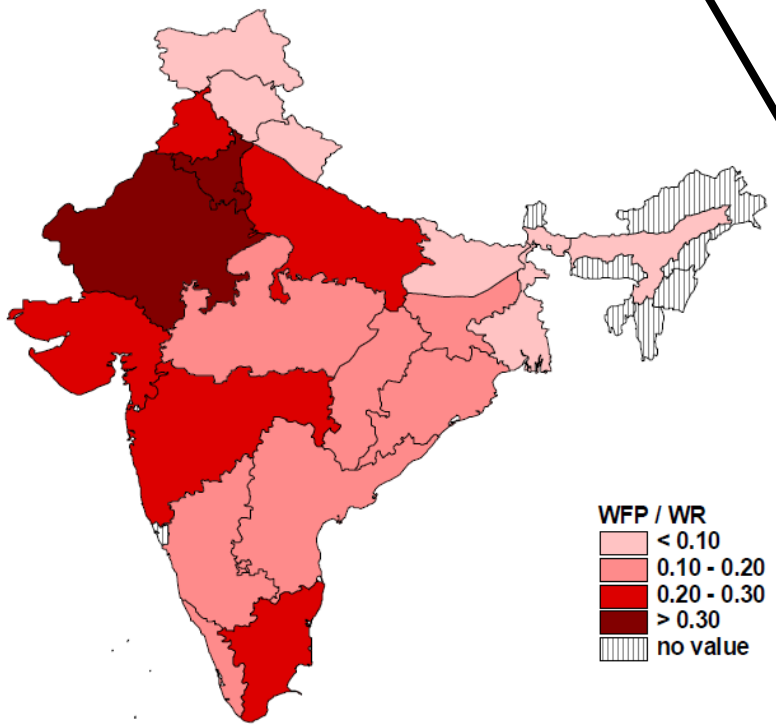
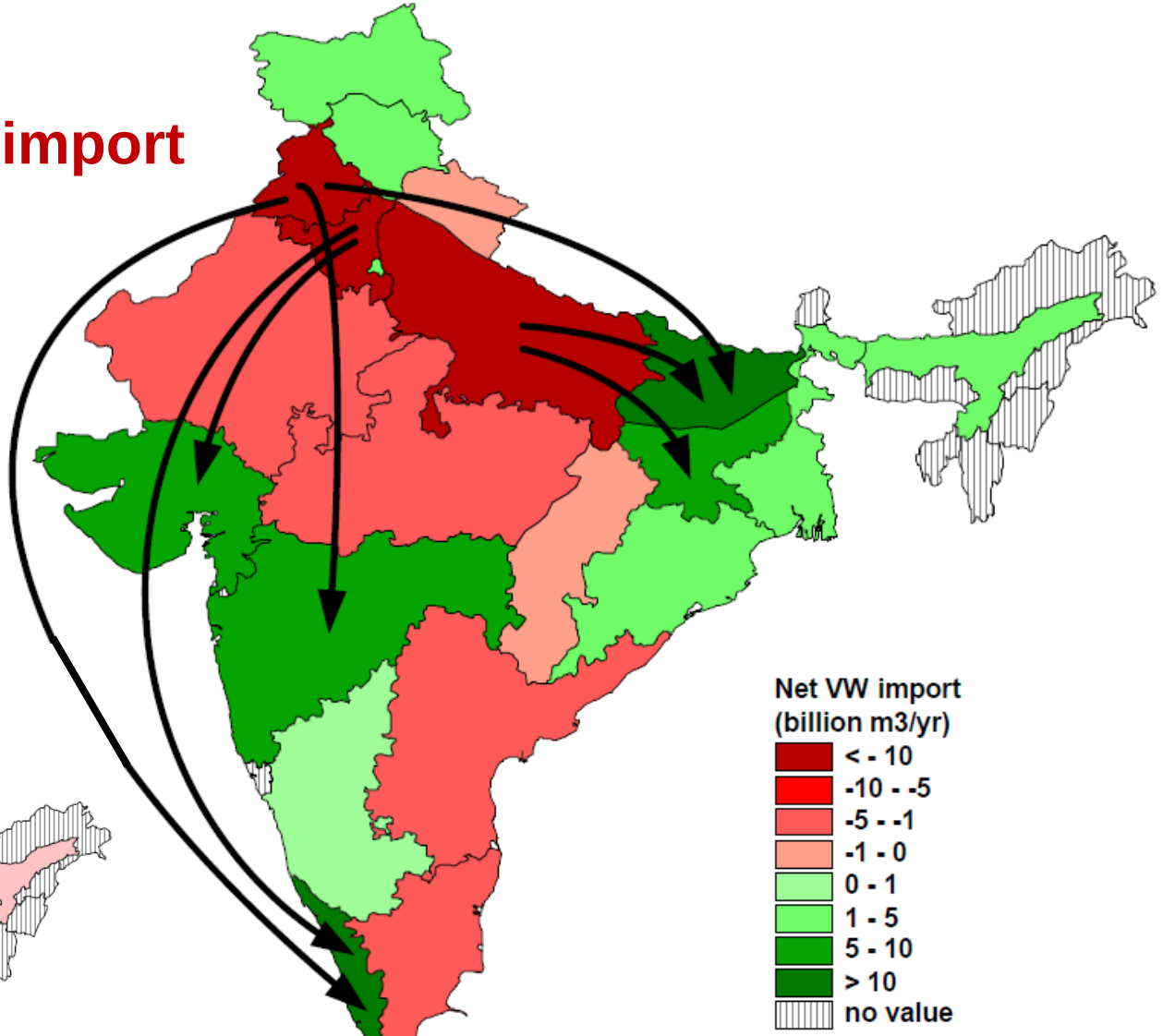
Net Virtual Water import

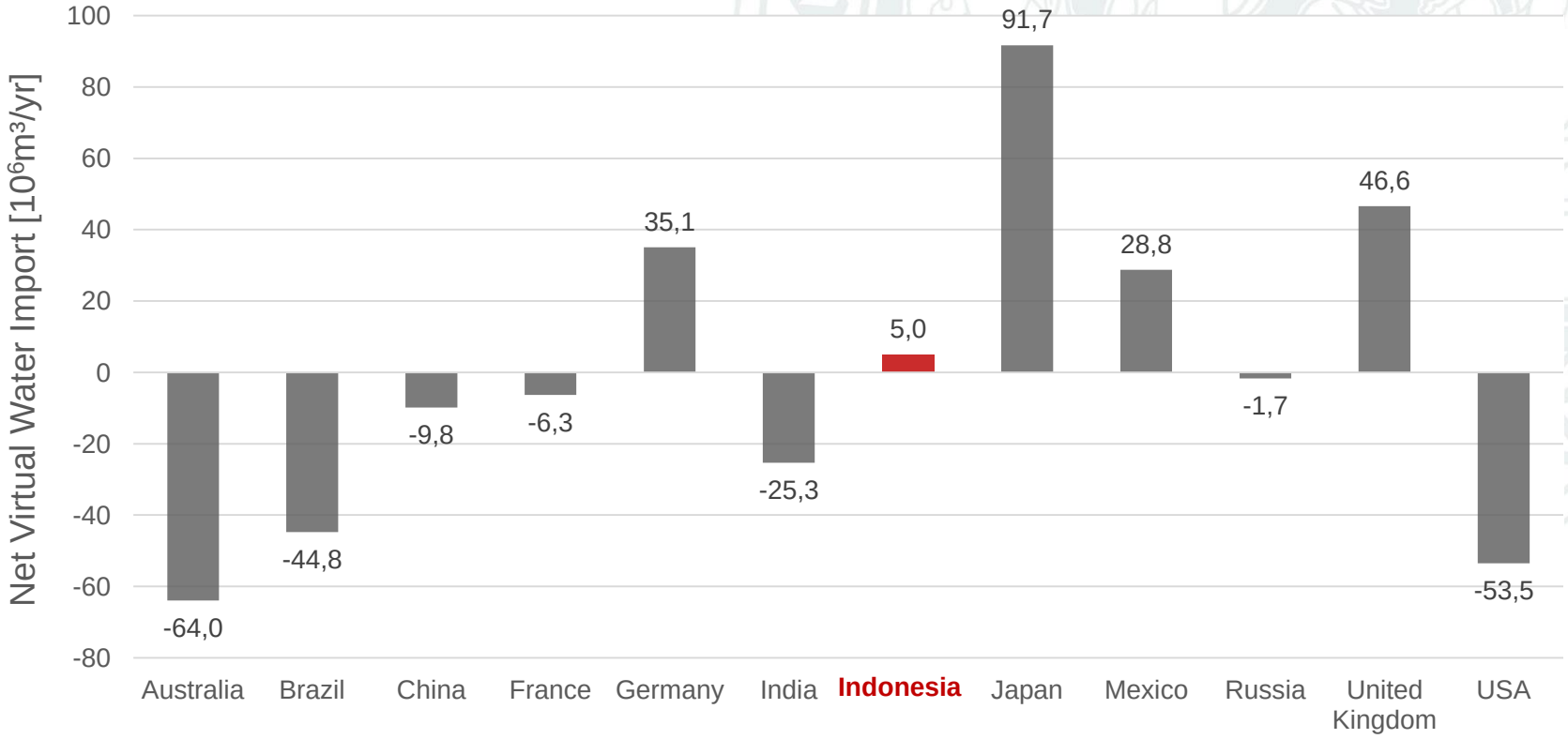
Water Scarcity / Cap.





Kampmann 2007, 41/50.

Virtual water flows for selected countries, 1997 - 2001



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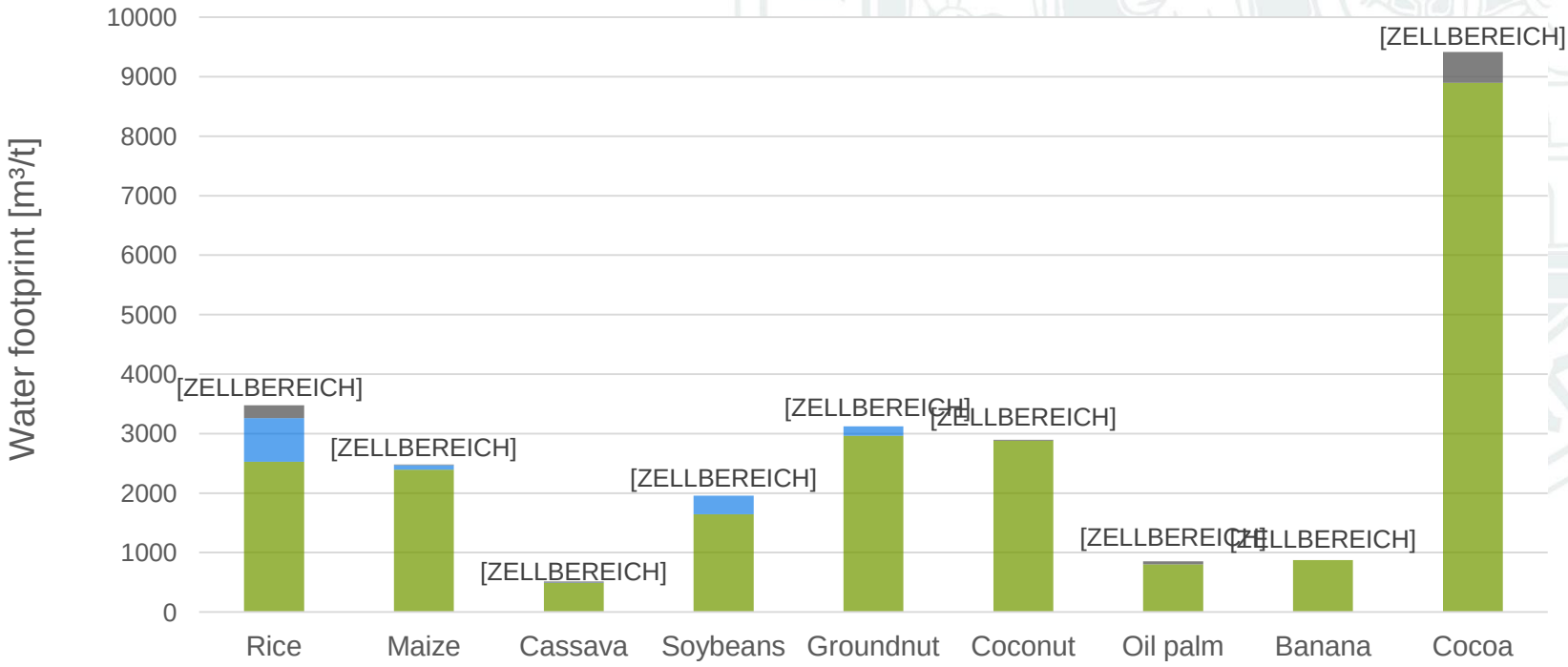
Own figure, data source: Chapagain/Hoekstra 2008, 24.

Average green, blue and grey water footprint of primary crops in Indonesia



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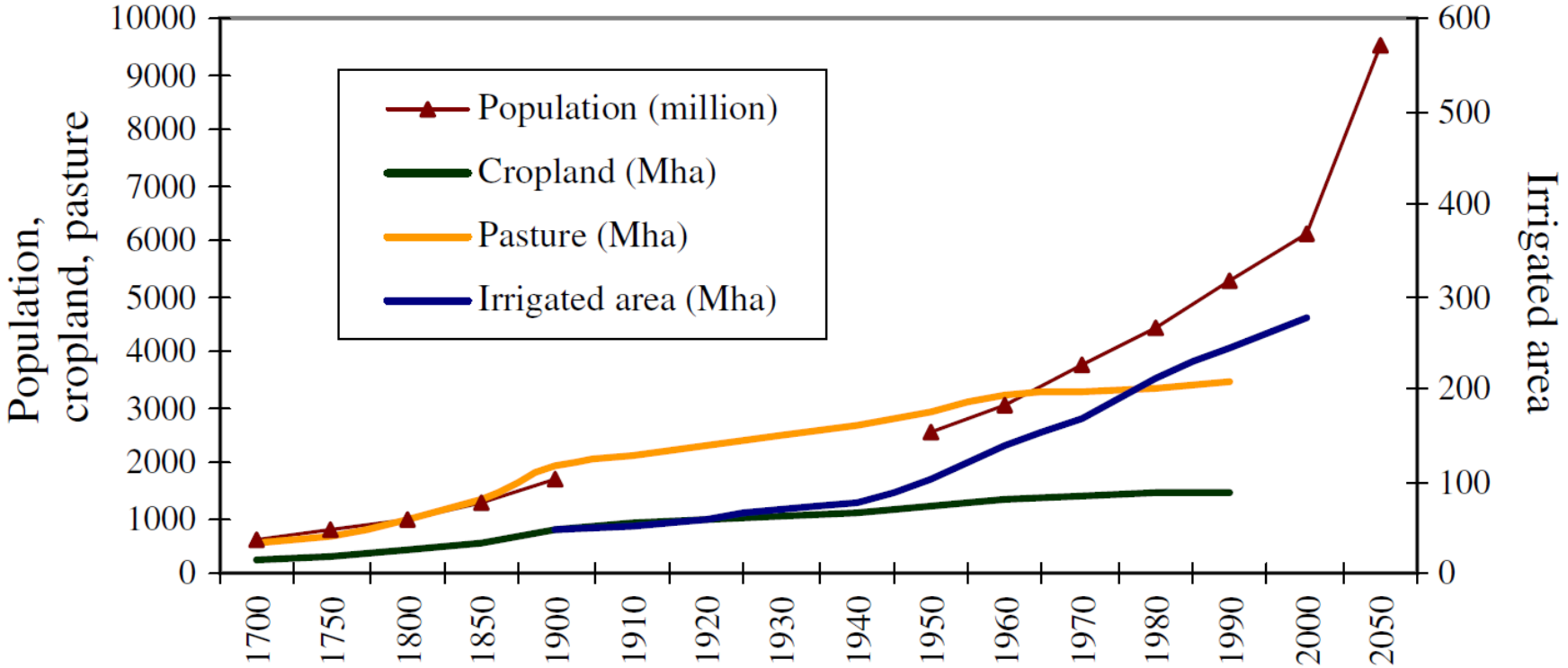
Own figure, data source: Bulsink et al. 2010, 121.

Population growth and global food production



Hanjra/Qureshi 2010: 370.

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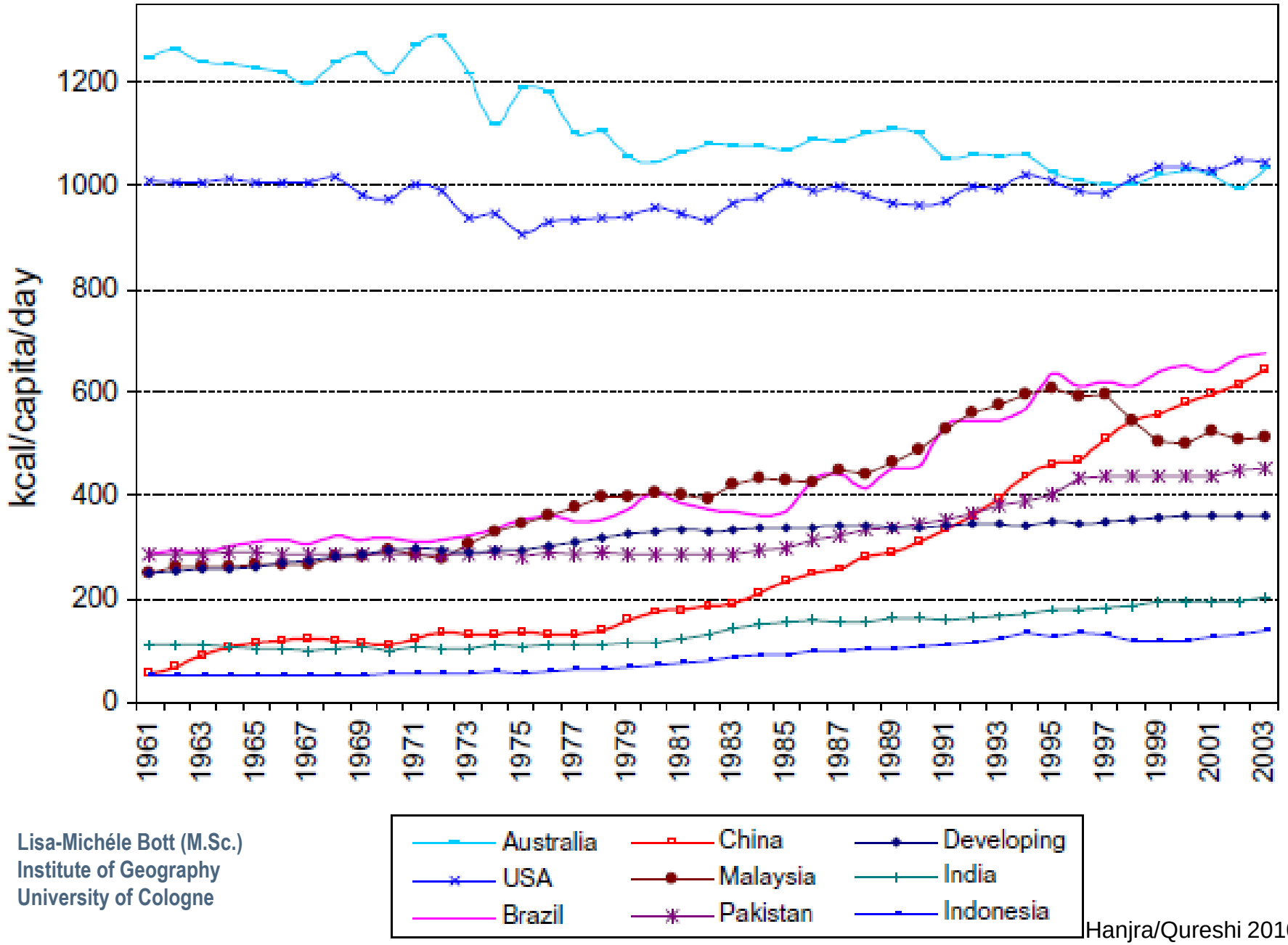
Trends in calorie consumption from animal products



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Hanjra/Qureshi 2010: 369.

Research questions

- Can a shift from blue to virtual water help to mitigate water supply deficits?
- How do changes in consumption pattern influence agricultural commodity chains?
- Did past changes of the commodity chain act to mitigate or aggravate water supply shortages?

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Research gaps

- **Integrative social and physical sciences studies**
- **Awareness and perception studies**
- **Stakeholder priorities**
- **Adaptation and sustainable development goals**

(Srinivasan et al. 2013; Foster 2001)

Methods

- Market analysis of the origin of food
- Wholesaler and retailers survey
- Household surveys
- Expert interviews
- Focus-group-discussions

→ modelling

→ actor-network analysis

→ syndrome approach

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Expected results

- Water/food consumption of households from different social backgrounds and by different settlement types
- Changes in water and food consumption over time
- Impacts of changes in the commodity chains
- Potential to mitigate water scarcity through virtual water trade

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Thank you for your attention

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