# Positive Bioenergy and Water Relationships

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# Overview

- About the Global Bioenergy Partnership (GBEP)
- GBEP Activity Group 6 – Bioenergy and Water
- Integrative planning, best management practices, bioremediation and control of invasive species
- Agroforestry, intercropping and rotational cropping

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# The Global Bioenergy Partnership (GBEP)


- Founded in 2005 as a G8+5 Partnership at the G8 Gleneagles Summit
- **Partners:** 23 countries + 14 international organizations
- **Observers:** 28 countries + 12 international organizations
- GBEP Secretariat is hosted at the FAO in Rome

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# GBEP Sustainability Indicators for Bioenergy

| Environmental pillar | Social pillar | Economic pillar |
|---|---|---|
| 1. Life-cycle GHG emissions | 9. Allocation and tenure of land for new bioenergy production | 17. Productivity |
| 2. Soil quality | 10. Price and supply of a national food basket | 18. Net energy balance |
| 3. Harvest levels of wood resources | 11. Change in income | 19. Gross value added |
| 4. Emissions of non-GHG air pollutants, including air toxics | 12. Jobs in the bioenergy sector | 20. Change in consumption of fossil fuels and traditional use of biomass |
| 5. Water use and efficiency | 13. Change in unpaid time spent by women and children collecting biomass | 21. Training and re-qualification of the workforce |
| 6. Water quality | 14. Bioenergy used to expand access to modern energy services | 22. Energy diversity |
| 7. Biological diversity in the landscape | 15. Change in mortality and burden of disease attributable to indoor smoke | 23. Infrastructure and logistics for distribution of bioenergy |
| 8. Land use and land-use change related to bioenergy feedstock production | 16. Incidence of occupational injury, illness and fatalities | 24. Capacity and flexibility of use of bioenergy |

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# GBEP Activity Group 6 – Bioenergy and Water

- Activity Group of the Working Group on Capacity Building (WGCB)
- Led by the IEA Technology Collaboration Programme on Bioenergy (Bioenergy TCP)
- Completed its activities November 2017

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# GBEP AG6: History

UNEP Paris | Bio Austr Conf Sunshine Coast | WWF Marseille | WWW Stklm | WBM Rotterdam | UNEP Paris | KSLA Stklm | EUBCE Amsterdam | WWW Stklm

2010 2011 2012 2013 2014 2015 2016 2017

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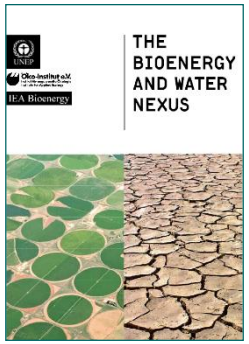


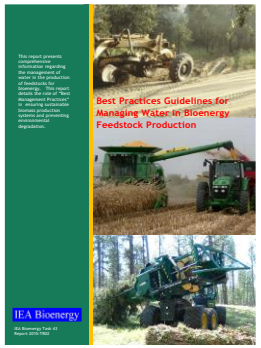


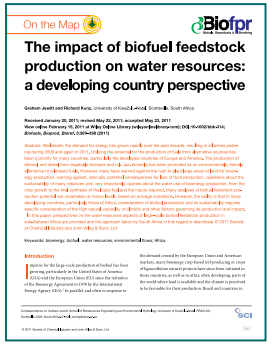



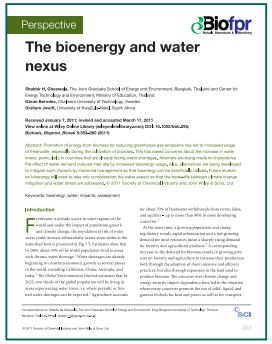


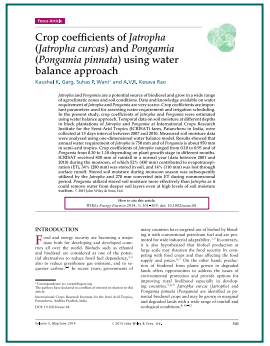


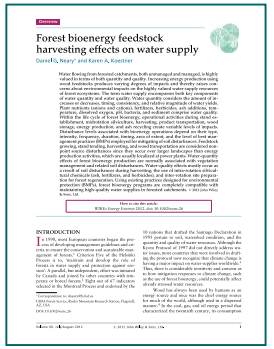


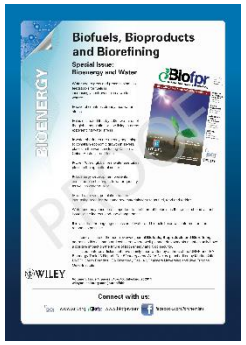


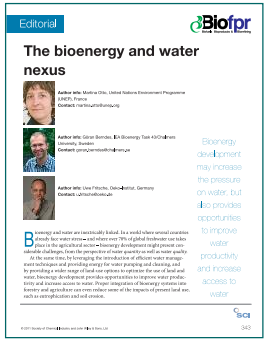


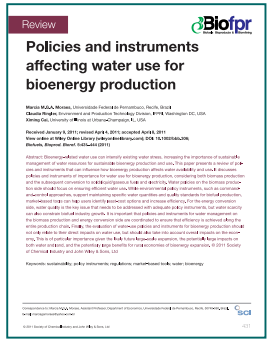


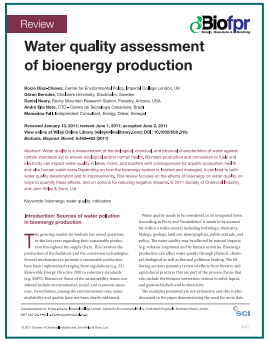


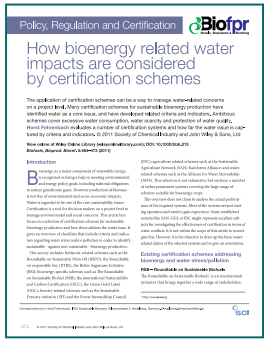



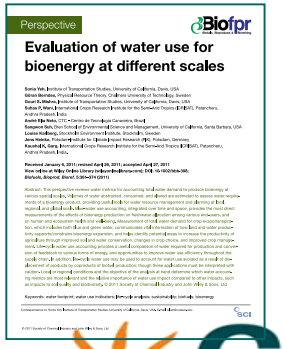


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# GBEP AG6: Vision

**Good management of resources - benefiting from complementarity of different land use systems - can deliver food, materials and bioenergy AND improve the state of water.**

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# GBEP AG6: Goal

**Identify and disseminate ways of integrating bioenergy systems into agriculture and forestry landscapes to improve sustainable management of water resources, including waste water.**

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# Examples of Positive Bioenergy and Water Relationships

- Contributions from 11 countries across six continents
- Selected contributions presented at workshop in August 2015
- All contributions presented in report that was published in February 2016
- Selected contributions also published in scientific journals

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# Integrated planning, best management practices, bioremediation and control of invasive species

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# Case study 1 – USA:
# Short rotation poplars for bioenergy and phytotechnologies

- Case study from WWW, Stockholm (2017)
- Selection of genotypes for specific traits can maximize benefits of plantations in different contexts
- Water-stressed sites – water-conserving genotypes maximize biomass production without causing detrimental impacts to water supply and/or quality
- Water-rich sites – water-using genotypes provide positive ecosystem services when used to treat wastewater, e.g. use of poplar plantations for phytoremediation, to treat leachate from landfill sites
- Provide multiple ecosystem benefits

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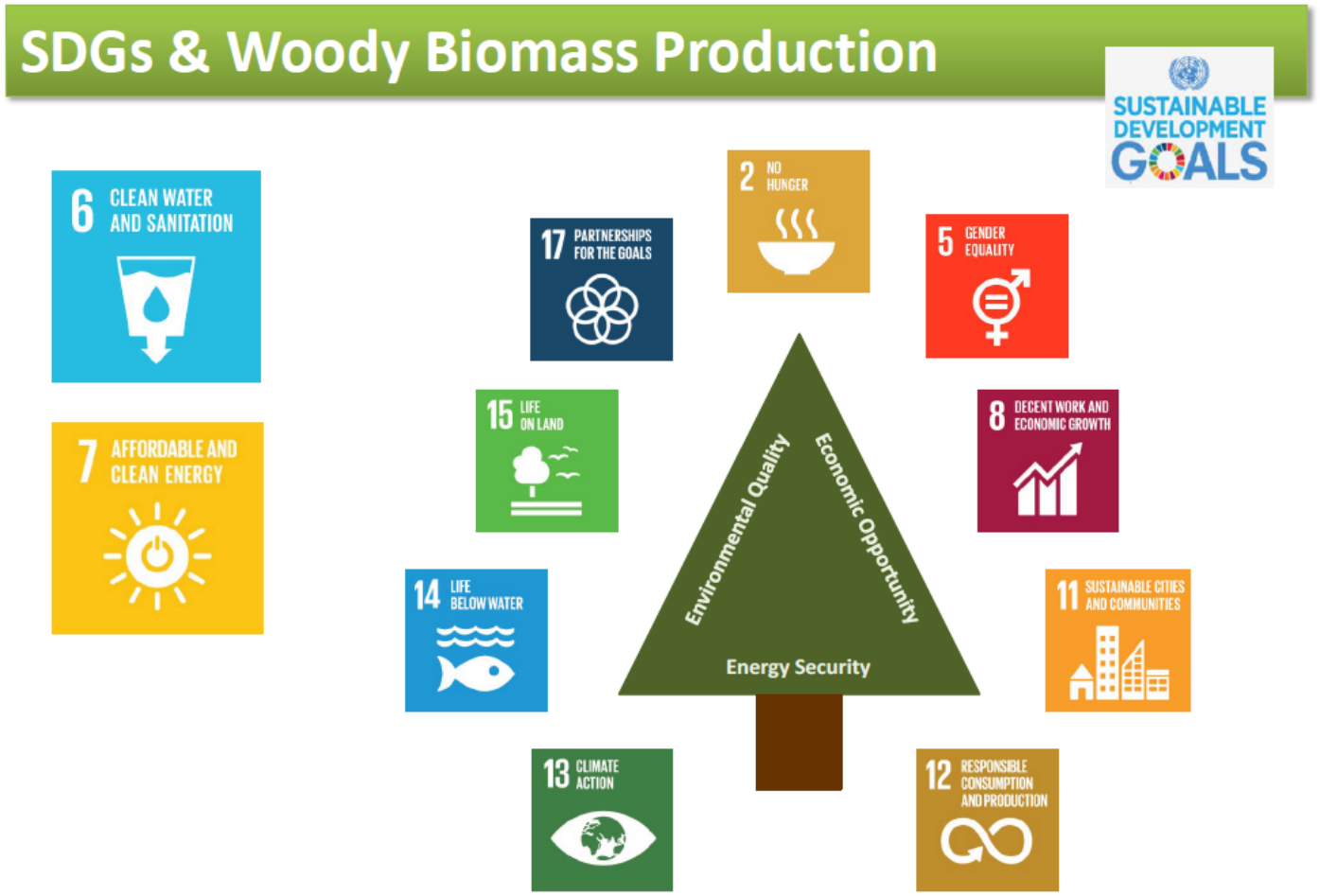
# Case study 1 – USA:
# Short rotation poplars for bioenergy and phytotechnologies




Source: http://www.un.org/sustainabledevelopment/sustainable-development-goals/

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# Waste to energy and water-smart processes

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# Case study 2 – Paraguay: Vinasse concentration for water use reduction

- Vinasse is a by-product of ethanol production
- It is traditionally stored in lagoons, with potential to contaminate surrounding water bodies
- Solution – concentration of vinasse to give:
  - Water with ideal pH to be reused in fermentation process
  - Concentrated vinasse used for fertirrigation of sugar cane

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# Case study 2 – Paraguay: Vinasse concentration for water use reduction

Benefits:

- Reduced water use by ethanol plant (as water is re-used)
- Reduced contamination of water bodies
- Energy and cost savings for fertirrigation (as concentrated vinasse is only 25% of original volume)
- Higher sugar cane yield (due to fertirrigation) – 50% expected increase over 5-year period

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# Case study 3 – China: Biogas from livestock waste

- Installation of biogas plants in piggeries to reduce water pollution from pig waste and produce bioenergy
- Digestate is utilized as liquid fertilizer in arable land or paddy fields
- Livestock breeding represents the main agricultural pollutant in Lake Tai, where extraction of water for domestic use was suspended in 2007 due to worsening quality

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# Case study 3 – China: Biogas from livestock waste

- Co-benefits:
  - Increased rice yield
  - Reduced fertilizer costs
- Important factors
  - Availability of arable land accepting digestate in the vicinity of piggeries
  - Government support for installation of biogas plants

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# Agroforestry, intercropping and rotational cropping

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# Case study 4 – Australia: Integrated tree crop systems

- Western dryland Australia suffers from soil and water degradation from salinity due to reduced plant water use under annual crops and pastures
- Mitigation of salinity required to:
  - maintain agricultural productivity of the region; and
  - protect and restore the terrestrial and aquatic biodiversity of the region
- Planting of integrated tree crops to reduce discharge of saline groundwater into waterbodies

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# Case study 4 – Australia: Integrated tree crop systems

- Benefits:
  - Improvements in water quality
  - Biomass/bioenergy production
  - Carbon sequestration and mitigation of GHG emissions
- Challenges:
  - Lack of stability in political and investment environment
  - Development of commercial-scale infrastructure

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# Key Messages

- AG6 work showed **encouraging variety** of water-efficient and positive-water-balance bioenergy options, both in terms of supply and geographical distribution
- There **are significant barriers** to “mainstreaming” such practices, however
- A prerequisite is a repository of data on these practices by “**trusted**” actors. GBEP has a role here, together with e.g. FAO, IEA, IEA Bioenergy TCP, IRENA

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# Thank you

## More information:

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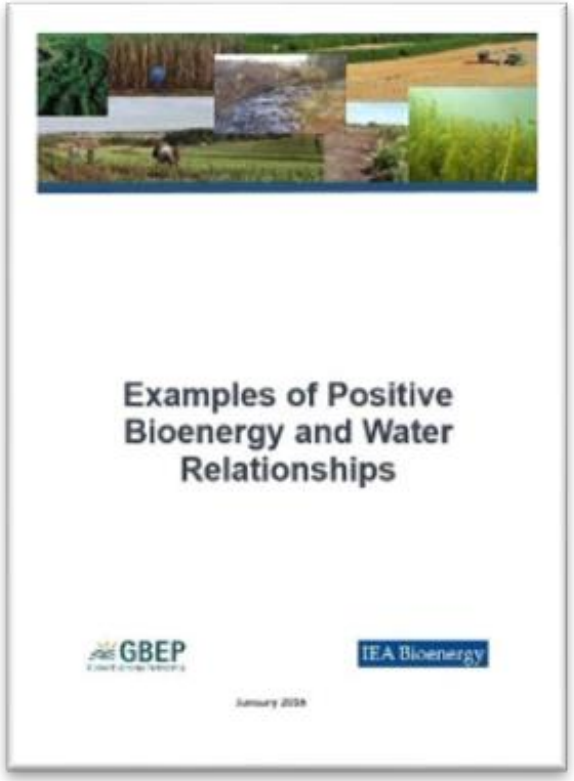


- www.globalbioenergy.org/programmeofwork/working-group-on-capacity-building-for-sustainable-bioenergy/activity-group-6/it/

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