

1. [Social–ecological traps and transformations in dryland agro-ecosystems: Using water system innovations to change the trajectory of development](#)

ผู้แต่ง: Elin Enfors

วารสาร: Global Environmental Change, Volume 23, Issue 1, February 2013, Pages 51–60

Abstract: Recent efforts to achieve a much needed productivity increase in farming systems across semi-arid and dry sub-humid sub-Saharan Africa have highlighted the potential of small-scale water system innovations (SWSIs). This paper takes a social–ecological resilience approach to investigate how this type of water management technology would influence agro-ecosystem dynamics, using a catchment in northeastern Tanzania as an example. The analysis finds that three external drivers (increasing dryspell frequency, population growth, and institutional changes) have interacted with a set of key variables in the studied system to shape a development trajectory over the past half-century where off-farm ecosystem services are being degraded while agricultural yields remain low and people remain poor. The analysis further finds that the evaluated SWSIs have the potential to destabilize feedbacks maintaining this social–ecological trap through several different mechanisms, and thereby open up for new development trajectories. A concluding discussion identifies a number of challenges to this type of transformation in sub-Saharan Africa, and outlines the type of investment approaches that would be needed to go from potential to reality.

2. [Industrial source identification and emission estimation of perfluorooctane sulfonate in China](#)

ผู้แต่ง: Shuangwei Xie, Tiewu Wang, Shijie Liu, Kevin C. Jones, Andrew J. Sweetman, Yonglong Lu

วารสาร: Environment International, Volume 52, February 2013, Pages 1–8

Abstract: Perfluorooctane sulfonate (PFOS) and related chemicals (collectively “PFOS equivalents”) are currently manufactured and used in a wide variety of industrial processes in China. Since 2003, the national annual production has increased dramatically to accommodate both domestic demands and ongoing overseas needs for metal plating, fire-fighting foams, photographic, semiconductor and aviation industries. Accordingly, PFOS-related industries are significant sources of PFOS to the environment in China, though little information is available. In the present study, industrial sources of PFOS in China were identified and emissions from major related industries, including PFOS manufacture, textile treatment, metal plating, fire-fighting and semiconductor industries, were evaluated. Contribution by various industrial sources and spatial distribution of the PFOS emission were discussed. It was estimated that the total emission of PFOS equivalents in China was 70 t in 2010. Industrial use of PFOS in metal plating was identified as the largest source of PFOS pollution at the national level, followed by textile treatment, fire-fighting, PFOS manufacture and semiconductor industry. At the regional level, greater contributions were made by metal plating and textile treatment in most provinces of eastern China, while in the western part of China and several northeastern provinces fire-fighting was the predominant source. The contribution by PFOS manufacture was considerable in Hubei and Fujian provinces. Total emission, emission density and emission intensity showed geographical variations. In

general, the eastern coastal provinces, as the most intensively industrialized regions of China, were characterized by significantly higher emission rates, emission density and emission intensity than those in western and northern China. Available monitoring data of PFOS concentrations in surface water of China reflected a similar distribution pattern, confirming that manufacture and industrial uses were crucial sources of PFOS pollution which would cause significant risks in the environment.

3. [4-Nonylphenol, bisphenol-A and triclosan levels in human urine of children and students in China, and the effects of drinking these bottled materials on the levels](#)

ผู้แต่ง: Xu Li, Guang-Guo Ying, Jian-Liang Zhao, Zhi-Feng Chen, Hua-Jie Lai, Hao-Chang Su

วารสาร: Environment International, Volume 52, February 2013, Pages 81–86

Abstract: 4-Nonylphenol (4-NP), bisphenol-A (BPA) and triclosan (TCS) are three industrial chemicals used widely in daily products. This study investigated 4-NP, BPA and TCS levels in urine samples of 287 children and students aged from 3 to 24 years old in Guangzhou, China. Total (free and conjugated) amounts of 4-NP, BPA and TCS in the urine samples were detected using gas chromatography–mass spectrometry with negative chemical ionization. The detection rates of 4-NP, BPA and TCS were 100%, 100% and 93% respectively, given the detection limits of 3.8, 0.5 and 0.9 ng/L respectively. Data for 4-NP, BPA and TCS were presented in both creatinine-adjusted (microgram per gram creatinine) and unadjusted (microgram per liter) urinary concentrations. The geometric mean (GM) concentrations of urinary 4-NP, BPA and TCS were 15.92 $\mu\text{g/g}$ creatinine (17.40 $\mu\text{g/L}$), 2.75 $\mu\text{g/g}$ creatinine (3.00 $\mu\text{g/L}$) and 3.55 $\mu\text{g/g}$ creatinine (3.77 $\mu\text{g/L}$) respectively. Multiple regression models considering age, gender, preferred drinking bottle and log-transformed creatinine were used to calculate the adjusted least square geometric mean (LSGM). Among these subjects, the females had higher LSGM concentrations of 4-NP, BPA and TCS than the males; and the only statistically significant difference was found for the LSGM concentrations of triclosan ($p = 0.031$). Participants who reported to use ceramic cups more frequently had significantly lower LSGM concentrations of BPA than those who used plastic cups ($p = 0.037$).

Meanwhile, a three-week test of using polycarbonate bottles and ceramic cups to drink bottled water and boiled tap-water was carried out among 12 graduate students of 25 years old. The GM concentrations of urinary BPA at the end of the first week after using ceramic cups to drink bottled water were 7.16 $\mu\text{g/g}$ creatinine, then decreased significantly to 3.49 $\mu\text{g/g}$ creatinine after the second week of using ceramic cups to drink boiled tap-water ($p < 0.05$), and finally increased to 4.15 $\mu\text{g/g}$ creatinine after the third week of using polycarbonate bottles in drinking boiled tap-water. The results indicate that in daily life the use of polycarbonate bottles or drinking of bottled water is likely to increase the ingestion of BPA, resulting in an increase in urinary BPA levels.

4. [Effects of persistent organic pollutants on the developing respiratory and immune systems: A systematic review](#)

ผู้แต่ง: Mireia Gascon, Eva Morales, Jordi Sunyer, Martine Vrijheid

วารสาร: Environment International, Volume 52, February 2013, Pages 51–65

Abstract:

Background

Disruption of developing immune and respiratory systems by early-life exposure to persistent organic pollutants (POPs) could result into reduced capacity to fight infections and increased risk to develop allergic manifestations later in life.

Objectives

To systematically review the epidemiologic literature on the adverse effects of early-life exposure to POPs on respiratory health, allergy and the immune system in infancy, childhood and adolescence.

Methods

Based on published guidelines for systematic reviews, two independent researchers searched for published articles in MEDLINE and SCOPUS using defined keywords on POPs and respiratory health, immune function and allergy. Study eligibility criteria were defined to select the articles.

Results

This review of 41 studies finds limited evidence for prenatal exposure to DDE, PCBs and dioxins and risk of respiratory infections. Evidence was limited also for postnatal exposure to PCBs, specifically ndl-PCBs, and reduced immune response after vaccination in childhood. The review indicates lack of association between postnatal exposure to PCBs/ndl-PCBs and risk of asthma-related symptoms. For the other exposure–outcome associations reviewed evidence was inadequate.

Discussion and conclusion

Current epidemiological evidence suggests that early-life exposure to POPs can adversely influence immune and respiratory systems development. Heterogeneity between studies in exposure and outcome assessment and the small number of studies for any given exposure–outcome relationship currently make comparisons difficult and meta-analyses impossible. Also, mechanisms remain largely unexplored. Recommendations for significantly improving our understanding thus include harmonization of exposure and outcome assessment between studies, conduct of larger studies, long-term assessment of respiratory infections and asthma symptoms in order to identify critical periods of susceptibility, integration of the potential immunotoxic mechanisms of POPs, and use of new statistical tools to detangle the role of multiple exposures on multiple outcomes.

5. [Development and Application of Dynamic Hybrid Multi-Region Inventory Analysis for Macro-level Environmental Policy](#)

[Analysis: A Case Study on Climate Policy in Taiwan](#)

ผู้แต่ง: Chia-Wei Chao, Reinout Heijungs, and Hwong-wen Ma

วารสาร: Environmental Science & Technology, Just Accepted, Publication Date (Web): February 5, 2013

Abstract: We develop a novel inventory method called Dynamic Hybrid Multi-Region Inventory analysis (DHMRI), which integrates the EEMRIOA and Integrated Hybrid LCA and applies time-dependent environmental intervention information for inventory analysis. Consequently, DHMRI is able to quantify the change in the environmental footprint caused by a specific policy while taking structural changes and technological dynamics into consideration. DHMRI is applied to assess the change

in the total CO₂ emissions associated with the total final demand caused by the climate policy in Taiwan to demonstrate the practicality of this novel method. The evaluation reveals that the implementation of mitigation measures included in the existing climate policy, such as an enhancement in energy efficiency, promotion of renewable energy and limitation of the growth of energy-intensive industries, will lead to a 28% increase in the total CO₂ emissions and that the main driver is the export-oriented electronics industry. Moreover, a major increase in the total emissions is predicted to occur in Southeast Asia and China. The observations from the case study reveal that DHMRI is capable of overcoming the limitations of existing assessment tools at macro-level evaluation of environmental policies.

[6. Trace element distributions in the water column near the Deepwater Horizon well blowout](#)

ผู้แต่ง: DongJoo Joung and Alan Shiller

วารสาร: Environmental Science & Technology, Just Accepted, Publication Date (Web): February 5, 2013

Abstract: To understand the impact of the Deepwater Horizon well blowout on dissolved trace element concentrations, samples were collected from areas around the oil rig explosion site during four cruises in early and late May 2010, October 2010 and October 2011. In surface waters, Ba, Fe, Cu, Ni, Mn, and Co were relatively well correlated with salinity during all cruises, suggesting mixing with river water was the main influence on metal distributions in these waters. However, in deep oil/gas plumes (1000 – 1400 m depth), modestly elevated concentrations of Co and Ba were observed in late May, compared with post blowout conditions. Analysis of the oil itself along with leaching experiments confirm the oil as the source of the Co, whereas increased Ba was likely due to drilling mud used in the top kill attempt. Deep plume dissolved Mn largely reflected natural benthic input, though some samples showed slight elevation probably associated with the top kill. Dissolved Fe concentrations were low and also appeared largely topographically-controlled and reflective of benthic input. Estimates suggest that microbial Fe demand may have affected the Fe distribution but probably not to the extent of Fe becoming a growth-limiting factor. Experiments showed that the dispersant can have some limited impact on dissolved-particulate metal partitioning.

[7. Covalent binding of sulfamethazine to natural and synthetic humic acids: assessing laccase catalysis and covalent bond stability](#)

ผู้แต่ง: Anna Gulkowska, Michael Sander, Juliane Hollender, and Martin Krauss

วารสาร: Environmental Science & Technology, Just Accepted, Publication Date (Web): February 5, 2013

Abstract: Sulfonamide antibiotics form stable covalent bonds with quinone moieties in organic matter via nucleophilic addition reactions. In this work, we combined analytical electrochemistry with trace analytics to assess the catalytic role of the oxidoreductase laccase in the binding of sulfamethazine (SMZ) to Leonardite humic acid (LHA) and to four synthetic humic acids (SHA) polymerized from low molecular weight precursors and to determine the stability of the formed bonds. In the absence of laccase, a significant portion of the added SMZ formed covalent bonds with LHA, but only a very small fraction (< 0.4%) of the total quinone moieties in LHA reacted. Increasing absolute, but decreasing relative concentrations of SMZ-LHA covalent bonds with increasing initial SMZ concentration suggested that the quinone moieties in LHA covered a wide

distribution in reactivity for the nucleophilic addition of SMZ. Laccase catalyzed the formation of covalent bonds by oxidizing unreactive hydroquinone moieties in LHA to reactive, electrophilic quinone moieties, of which a large fraction (5%) reacted with SMZ. Compared to LHA, the SHA showed enhanced covalent bond formation in the absence of laccase, suggesting a higher reactivity of their quinone moieties towards nucleophilic addition. This work supports that binding to soil organic matter is an important process governing the fate, bioactivity, and extractability of sulfonamides in soils.

8. [A physiologically based kinetic model for bacterial sulfide oxidation](#)

ผู้แต่ง: Johannes B.M. Klok, Marco de Graaff, Pim L.F. van den Bosch, Nadine C. Boelee, Karel J. Keesman, Albert J.H. Janssen

วารสาร: Water Research, Volume 47, Issue 2, 1 February 2013, Pages 483–492

Abstract: In the biotechnological process for hydrogen sulfide removal from gas streams, a variety of oxidation products can be formed. Under natron-alkaline conditions, sulfide is oxidized by haloalkaliphilic sulfide oxidizing bacteria via flavocytochrome c oxidoreductase. From previous studies, it was concluded that the oxidation-reduction state of cytochrome c is a direct measure for the bacterial end-product formation. Given this physiological feature, incorporation of the oxidation state of cytochrome c in a mathematical model for the bacterial oxidation kinetics will yield a physiologically based model structure. This paper presents a physiologically based model, describing the dynamic formation of the various end-products in the biodesulfurization process. It consists of three elements: 1) Michaelis–Menten kinetics combined with 2) a cytochrome c driven mechanism describing 3) the rate determining enzymes of the respiratory system of haloalkaliphilic sulfide oxidizing bacteria. The proposed model is successfully validated against independent data obtained from biological respiration tests and bench scale gas-lift reactor experiments. The results demonstrate that the model is a powerful tool to describe product formation for haloalkaliphilic biomass under dynamic conditions. The model predicts a maximum S^0 formation of about 98 mol%. A future challenge is the optimization of this bioprocess by improving the dissolved oxygen control strategy and reactor design.

9. [Influence of hydraulic regimes on bacterial community structure and composition in an experimental drinking water distribution system](#)

ผู้แต่ง: I. Douterelo, R.L. Sharpe, J.B. Boxall

วารสาร: Water Research, Volume 47, Issue 2, 1 February 2013, Pages 503–516

Abstract: Microbial biofilms formed on the inner-pipe surfaces of drinking water distribution systems (DWDS) can alter drinking water quality, particularly if they are mechanically detached from the pipe wall to the bulk water, such as due to changes in hydraulic conditions. Results are presented here from applying 454 pyrosequencing of the 16S ribosomal RNA (rRNA) gene to investigate the influence of different hydrological regimes on bacterial community structure and to study the potential mobilisation of material from the pipe walls to the network using a full scale, temperature-controlled experimental pipeline facility accurately representative of live DWDS.

Analysis of pyrosequencing and water physico-chemical data showed that habitat type (water vs. biofilm) and hydraulic conditions influenced bacterial community structure and composition in our experimental DWDS. Bacterial community composition clearly differed between biofilms and bulk water samples. *Gammaproteobacteria* and *Betaproteobacteria* were the most abundant phyla in biofilms while *Alphaproteobacteria* was predominant in bulk water samples. This suggests that bacteria inhabiting biofilms, predominantly species belonging to genera *Pseudomonas*, *Zooglea* and *Janthinobacterium*, have an enhanced ability to express extracellular polymeric substances to adhere to surfaces and to favour co-aggregation between cells than those found in the bulk water. Highest species richness and diversity were detected in 28 days old biofilms with this being accentuated at highly varied flow conditions. Flushing altered the pipe-wall bacterial community structure but did not completely remove bacteria from the pipe walls, particularly under highly varied flow conditions, suggesting that under these conditions more compact biofilms were generated.

This research brings new knowledge regarding the influence of different hydraulic regimes on the composition and structure of bacterial communities within DWDS and the implication that this might have on drinking water quality.

10. [Escherichia coli survival in waters: Temperature dependence](#)

ผู้แต่ง: R.A. Blaustein, Y. Pachepsky, R.L. Hill, D.R. Shelton, G. Whelan

วารสาร: Water Research, Volume 47, Issue 2, 1 February 2013, Pages 569–578

Abstract: Knowing the survival rates of water-borne *Escherichia coli* is important in evaluating microbial contamination and making appropriate management decisions. *E. coli* survival rates are dependent on temperature, a dependency that is routinely expressed using an analogue of the Q_{10} model. This suggestion was made 34 years ago based on 20 survival curves taken from published literature, but has not been revisited since then. The objective of this study was to re-evaluate the accuracy of the Q_{10} equation, utilizing data accumulated since 1978. We assembled a database of 450 *E. coli* survival datasets from 70 peer-reviewed papers. We then focused on the 170 curves taken from experiments that were performed in the laboratory under dark conditions to exclude the effects of sunlight and other field factors that could cause additional variability in results. All datasets were tabulated dependencies “log concentration vs. time.” There were three major patterns of inactivation: about half of the datasets had a section of fast log-linear inactivation followed by a section of slow log-linear inactivation; about a quarter of the datasets had a lag period followed by log-linear inactivation; and the remaining quarter were approximately linear throughout. First-order inactivation rate constants were calculated from the linear sections of all survival curves and the data grouped by water sources, including waters of agricultural origin, pristine water sources, groundwater and wells, lakes and reservoirs, rivers and streams, estuaries and seawater, and wastewater. Dependency of *E. coli* inactivation rates on temperature varied among the water sources. There was a significant difference in inactivation rate values at the reference temperature between rivers and agricultural waters, wastewaters and agricultural waters, rivers and lakes, and wastewater and lakes. At specific sites, the Q_{10} equation was more accurate in rivers and coastal waters than in lakes making the value of the Q_{10} coefficient appear to be site-specific. Results of this work indicate possible sources of uncertainty to be accounted for in watershed-scale microbial water quality modeling.