1.5 Health and Environment Risks associated with Urban Agriculture

Crops and/or cereals growing on suspect land and dubious water.

(Picture: René van Veenhuizen)

Health and environmental risks associated with Urban Agriculture

Karen Lock (London School of Hygiene and Tropical Medicine, London) and Henk de Zeeuw (ETC-RUAF, Leusden, the Netherlands)

karen.lock@lshtm.ac.uk

h.dezeeuw@etcnl.nl

1. Introduction

Urban agriculture can have both negative and positive effects on the health and environmental conditions of the urban population.
This section deals mainly with the health and environmental risks of urban agriculture. The positive aspects on health and environment are dealt with in the sections on urban food security and nutrition and the section on urban ecology respectively.

Like rural agriculture, urban agriculture entails risks to health and the environment, if not managed and carried out properly. It is essential to address the health risks associated with urban agriculture for two main reasons (Flynn 1999):

I. to protect consumers from contaminated foods and farm workers from occupational hazards; and

II. to secure the support of municipal and national authorities for sustainable urban food production.

City authorities have often been reluctant to accept urban agriculture because of perceived health risks. Nevertheless, in most cities in developing countries, urban agriculture is practised on a substantial scale, despite prohibitive laws and regulations. Hence, rather than general laws prohibiting urban agriculture, which are largely ineffective, policies are needed that actively **manage** the health risks related to urban agriculture.

2. Overview of the major categories of health risks associated with urban agriculture

Birley and Lock (1999) make an extensive review of the literature on health issues related to urban agriculture.

The main health risks associated with urban agriculture can be grouped into the following categories:

a. Contamination of crops with **pathogenic organisms** (e.g. bacteria, protozoa, viruses or helminths), due to irrigation by water from polluted streams, or inadequately treated waste water or organic solid waste products;

b. Human diseases transferred from **disease vectors** attracted by agricultural activity;

c. Contamination of crops and/or drinking water by **residues of agrochemicals**;

d. Contamination of crops by uptake of **heavy metals** from contaminated soils, air or water;

e. Transmission of diseases from domestic animals to people (**zoonosis**) during animal husbandry, processing or meat consumption;

f. Human diseases associated with **unsanitary post-harvest processing, marketing and preparation** of locally produced food; and

g. **Occupational health risks** for workers in the food-production and food-processing industries.

Review of the available literature indicates that, although insight into the potential health risks of urban and periurban agriculture is growing, detailed information on the actual health impacts of URBAN AGRICULTURE is scant.

3. Contamination of crops with pathogenic organisms by reuse of urban wastewater and organic solid waste products

a. Reuse of urban organic solid waste products

The main use of solid waste is as a soil improver (household waste, market refuse, sewerage, night soil, manure, fish waste, and agro-industrial waste). Agro-industrial waste, household refuse and market waste are also used to produce feed for livestock and fish.

Composting is the most common form of processing urban organic waste products. Composting reduces several health risks by:

- getting refuse ‘off the street’ and so reducing health hazards related to inadequate refuse collection and disposal (and associated risks such as transmission of diarrhoea and dysentery by houseflies, increased breeding of mosquitoes and contamination through scavenging animals);
- by sanitising waste through heat destruction of some pathogens, including helminth eggs found in night soil.

There are four main health risks related to the reuse of organic waste products:

1. Pathogens may not be destroyed (especially helminth eggs in night soil) if the compost is not properly prepared (too low temperature). The risk is greatly enhanced if organic materials are mixed with human excreta from latrines, manure or hospital waste, causing pathogens to breed.
2. Improperly maintained compost heaps may attract rodents (which may be reservoirs of diseases) and insects (which may be vectors of diseases).
3. Non-biodegradable fragments may cause injuries, skin infections, respiratory problems and other occupational problems of waste pickers, waste selectors and others involved in the composting process.
4. Heavy metal contamination due to mixing of organic materials with industrial waste (caused for example by occasional dumping of industrial waste in open spaces within residential areas).

b. Irrigation with improperly treated wastewater

Liquid waste from domestic sewage is widely used for irrigation and fertilisation of field crops, perennials and trees, biogas production, and fish ponds. A large part of the wastewater used is untreated or poorly treated.

Wastewater contains various bacteria, protozoan parasites, enteric viruses and helminths. These risks are not limited to official wastewater but often also apply to rivers and other open

water sources, as indicated by figures gathered by Westcott (FAO, unpublished, cited in Birley and Lock, 1999): 45% of 110 rivers tested carried faecal coliform levels higher than the WHO standard for unrestricted irrigation.

There are many forms through which untreated wastewater can lead to human diseases in urban agriculture. Coliform bacteria are mainly transmitted to humans from contaminated wastewater that has been used to irrigate crops. Another route is by consumption of contaminated meat from domestic animals that ingested tapeworm eggs from faeces in untreated sewage. Poorly treated sewage may contain viable stages of the hookworms that live in moistened soils and affect agricultural workers who expose their bare skin to the soil. Transmission of pathogens may also take place by fertilisation of fish ponds with human and animal waste products (e.g. overhanging latrines, overhanging poultry cages, ducks, addition of urban night soil and use of wastewater).

Furedy (1996) points out that official attitudes towards the health risks associated with reuse of urban waste products have historically changed with necessity. Furthermore, she believes that perceived health risks of the reuse of urban waste products in agriculture are overstated and that regulations concerning waste reuse are frequently outdated or lack comprehensiveness.

Armar-Klemesu et al. (1998) indicate that the major sources of bacterial contamination of fresh vegetables may draw from the distribution, handling and marketing system rather than from production.

Prevention and control measures suggested in the literature:

- Improved intersectoral linkages between health, agriculture, waste and environmental management; well-defined priorities and joint strategies; adoption of clear waste reuse policies for urban agriculture which are based on health criteria and impact assessments of waste reuse schemes in agriculture.
- Waste separation at source; regular collection of organic refuse; prevention of mixing household waste with waste of hospitals and non-agroindustries.
- Establishment of decentralised composting sites; securing the application of proper composting methods (temperature, duration) to ensure killing of pathogens; recognition of the various informal actors involved in the processing of urban waste products and the marketing of recycled products; enabling clean water supply and sanitation services at dump and processing sites.
- Identification of quality standards for municipal waste streams and composts produced from them; monitoring of quality of soils, irrigation water from rivers and wastewater outlets, and of composts; certification of safe production areas; restriction of crop choice in areas where wastewater is used but water quality cannot be guaranteed.
- Establishment of adequate wastewater treatment facilities with appropriate water treatment technologies, e.g. waste stabilisation pond systems rather than sludge treatment plants - the former are cheaper to establish and maintain and retain more nutrients.
- Farmer education on management of health risks, for workers and consumers, associated with reuse of waste in agriculture, including:
  a. avoidance of direct exposure to wastewater and soils treated with wastewater, e.g.

by using boots and protective clothing, and regular washing of hands and feet;
b. adaptation of crop choice in wastewater-treated land: e.g. it is not appropriate to grow fresh salad crops such as tomato, lettuce, parsley, cucumber and mint in poorly-treated water; these could be replaced by fodder, fibre, wood and seed crops; and

- c. application of drip irrigation or other localised irrigation methods (rather than sprinkler, gravity or spraying). Irrigation with wastewater must be stopped three weeks prior to harvesting.
- Consumer education, e.g. scraping and washing of fresh salads; eating only well-cooked crops, meat and fish from wastewater-fed crops, animals and ponds.
- Fish farmer education regarding precautions in the management of wastewater-fed fish ponds.

4. Diseases transmitted by disease vectors attracted by agricultural activity

Malaria occurs in many environments but particularly in areas where irrigation is practised. Malaria in relation to urban agriculture is a serious risk in Africa only. Adaptation of malaria mosquitoes to urban environments has been observed. Most malaria is found on the periphery of the cities where mosquitoes (the main one being *Anopheles gambiae*) breed in temporary water pools that contain clean, sunlit and shallow standing water in rice fields and poorly drained water surfaces (due to irrigation or interfering with natural drainage) and uncovered water tanks.

The type of crops grown and farming methods used in urban agriculture determine to a large extent whether or not urban agriculture increases malaria risks. The conditions for growing wet crops and forms of ridge cultivation (e.g. rice, sweet potato and yams) are favourable for the breeding of malaria mosquitoes. Cassava growing is only occasionally a problem, when it is grown in cultivation ridges in wet clay soil. In contrast, maize and banana crops, as well as tall grasses, present **no** particular malaria risk, as is often thought in African cities. There are many examples where authorities have traditionally justified destruction of urban crops by saying that anopheles breed in leaf axils (such as those of maize) whereas research clearly indicates the axils of maize plants are never breeding sites for malaria or any other kind of mosquito.

Filariasis is transmitted by the mosquito, *Culex quienquefasciatus*, which breeds in standing water that is highly polluted with organic matter. This occurs typically in densely populated human settlements where conditions include pit latrines, blocked sewage drains, cesspits and septic tanks, soak pits and poorly designed sewage-treatment plants. Filariasis is spreading rapidly due to urbanisation.

The Aedes mosquito, which is the main vector of dengue, breeds in water containers that include much solid waste (e.g. tin cans, coconut husks, rubber tyres, water storage jars).

Chagas disease has recently been emerging in periurban areas mainly in Latin America.

Poor disposal of organic solid waste (animal manure, crop residues and other farm refuse) may also attract rodents and flies that may be carriers of diseases (e.g. plague), and scavenging by domestic animals (e.g. cats, pigs and rats) is associated with a range of food-borne diseases such as amoebic and bacillary dysentery.

Suggested prevention and control measures:

- Co-operation between the health sector and the natural resource management sector (solid waste management, water storage, sewerage, agriculture and irrigation) is essential to reduce vector-borne diseases. Filariasis control is not sustainable until related urban problems, such as solid-waste management, are solved in an integrated way (drains are often blocked by garbage due to ineffective collection systems). Solid waste management is also essential for the control of dengue and dysentery (as well as rodent control programmes).
- Water tanks and irrigation systems (especially in periurban areas) need to be properly designed to prevent malaria.
- Application of slow-release floating formulations to control the malarial vector; mosquitoes breeding in latrines and stagnant polluted waters can be controlled effectively by the use of expanded polystyrene balls.

5. Residues of agrochemicals

Urban agriculture provides various potential exposure pathways to agrochemicals including occupational and environmental exposure and consumption. The intensive use of agrochemicals (fertilisers, pesticides, fungicides) may lead to residues of agrochemicals in crops or groundwater, and negative effects on the health of agricultural workers. Because of differences in usage, the level of risk of crop or groundwater pollution due to agrochemicals is higher in intensive commercial horticulture, especially for vegetables, than in traditional and subsistence farming (WHO Commission on Health and Environment 1992).

Acute poisoning due to agrochemicals can cause a range of symptoms which are often not correctly diagnosed (e.g. dizziness, diarrhoea, headache, memory impairment, convulsions, coma, liver and kidney impairment and lung fibrosis). Ingestion of agrochemicals is a common way of committing suicide throughout the world.

Chronic illnesses have been associated with residues in foodstuffs due to concentration of agrochemicals in the food chain, including vegetables, red meat, poultry and eggs, and residues can be found in human milk (FAO and WHO 1988).

Suggested prevention and control measures include:

- farmer education on the proper management of agrochemicals;
- promotion of ecological farming practices and replacement of chemical pest and disease control by IPM (integrated pest and disease management);
- better control of sales of banned pesticides;
- introduction of cheap protective clothing and equipment; and
- monitoring of residues of agrochemicals in groundwater.

6. Uptake of heavy metals from contaminated soils, water and air

The main causes of soil pollution from heavy metals (including lead, cadmium, chromium, zinc, copper, nickel, mercury, manganese, selenium, mercury and arsenic) are irrigation with water from streams and wastewater contaminated by industry, the application of contaminated solid waste products and the use of former industrial land contaminated by

spilled oil and industrial waste products.

Important sources of heavy metals are smelters, refineries, manufacturing plants, vehicles, metalliferous mines, ceramic industry (lead and cadmium), leather tanneries (chromium salts), lignite-based power plants, aluminium industry, electronics industry, and metallurgical industry. Some heavy metals precipitate in sewage sludge, which can therefore contain rather high concentrations.

The heavy metals may accumulate in the edible parts of crops that are consumed by people or fed to animals. Plant uptake of heavy metals varies, which opens up the possibility of adapting the choice of crops in relation to the degree and type of contamination. Generally, the highest amounts of heavy metals accumulate in the leaves, whereas the lowest contents are located in seeds. Beans, peas, melons, tomatoes and peppers show very low uptake figures. Plant uptake of heavy metals (especially of cadmium and lead) also varies with soil pH (Iretskaya and Chien, 1998).

In contrast to pathogenic contamination, the risk of heavy metals in wastewater used in urban agriculture is less conclusive as few studies have examined this issue. The risk depends primarily on the upstream sources of pollution. The extent of industrial pollution in an area is an important factor.

Puschenreiter et al. (1999) conclude that, after considering the several available pathways to reduce the transfer of heavy metals to the human food chain, urban soils with slight heavy-metal contamination can be used safely for gardening and agriculture if proper precautions are followed. However, Birley and Lock (1999,) argue that little is known of the chronic health effects of consuming tiny amounts of heavy metals over long periods of time, and that further research is needed. Increased concentration in the human food chain over a long period can provoke detectable damage to health (carcinogenic and mutagenic effects).

Suggested prevention and control measures encountered in the literature, include the following:

- definition of norms regarding crop restrictions according to type and level of contamination of agricultural soils; testing of agricultural soils and irrigation water for heavy metals;
- a minimum distance is recommended between fields and main roads and/or boundary crops to be planted beside roads to reduce contamination of crops by lead and cadmium;
- soil treatment for immobilisation of heavy metals: application of lime increases pH and thus decreases the availability of metals, except for selenium; application of farmyard manure reduces the heavy metal content of nickel, zinc and copper (but may increase cadmium levels); iron oxides (e.g. red mud) and zeolites are also known to absorb heavy metals such as cadmium and arsenic;
- washing and processing of contaminated crops may effectively reduce heavy metal content: good results were obtained for lead (less so for cadmium) in green beans, spinach, potatoes, whereas peas virtually showed no change;
- use of plants such as Indian grass (*Brassica juncea, L*) for biological remediation of polluted soils or streams (when planted in hydroponic beds); and

- more research on chronic health impacts of heavy metals

7. Zoonosis

Zoonotic diseases are infectious diseases transmitted through direct contact of human beings with animals during production processes or ingestion of contaminated animal products.

Two major bacterial diseases carried by cattle are bovine tuberculosis and brucellosis. Bovine tuberculosis is transmitted via the ingestion of contaminated unpasteurised milk from infected cows, and causes symptoms similar to respiratory tuberculosis. Bovine tuberculosis is transmitted via the ingestion of contaminated unpasteurised dairy products or through direct contact with infected animal material (blood, urine) and forms a main occupational hazard for livestock farmers and slaughterhouse workers. It can also spread by air-borne transmission and inhalation (e.g. in the neighbourhood surrounding a slaughterhouse).

Taeniasis and cysticercosis (beef and pig tapeworm) are transmitted by consumption of meat infected with tapeworm eggs congested by animals that scavenge on human faeces, or of crops irrigated with improperly treated sewage. Pig tapeworms create more severe effects in humans than beef tapeworm. Trichinosis is transmitted by consumption of infected meat of pigs that scavenge on food waste and dead animals.

Anthrax is most common in people who work with livestock or work in animal product industries (e.g. tannery). It can be transmitted through a cut in the skin, by inhalation of bacterial spores or consumption of infected meat.

Leptospirosis (Weil's disease) is transmitted through the contact of humans with infected animal urine or contaminated feedstuff or by swimming in or drinking from water supplies contaminated with animal urine.

Salmonella and campylobacter can be transmitted through contamination of animal feed. Animals (especially poultry) shed pathogens in their faeces in slaughterhouses, which may infect the meat. The wastewater discharge from intensive poultry farms can carry heavy loads of these micro-organisms and may contaminate drinking water supplies.

Suggested preventive and control measures include:

- collection of better prevalence data for the most important zoonoses;
- consumer education regarding thermal treatment of all milk and dairy products and proper cooking or freezing of meat products;
- restriction of uncontrolled movement of livestock in urban areas (e.g. stall feeding) and/or improvement of the urban waste-collection system;
- strict slaughterhouse regulations; condemning pig carcasses infected with tapeworms (which is sometimes a very high percentage);
- simple laboratory antigen-testing for anthrax infection of suspect animal products (such as carcasses and hides); disinfection of wool and fur;
- control of import of dogs and sheep in areas where Trichinosis is rare;

- prevention of genetic reassortment between avian viruses in pigs and human viruses (e.g. human influenza A) by not linking pigs and poultry in combination with fish pond operations; and
- composting of manure before application.

8. Issues and challenges for further research

The consideration of the public health and environmental risks associated with urban agriculture is an important element in policy decisions on urban agriculture.
However, the review of the available literature indicates that, although insight into the potential health risks of urban and periurban agriculture is growing, detailed information on the actual health impacts of urban agriculture is scant. Many of the health risks that are brought in relation to urban agriculture are not specific to urban agriculture and many of the perceived risks are based on research in rural agriculture. One can encounter cases in the literature where warnings are given about e.g. heavy metals in urban produced food due to use of contaminated soils or irrigation water, when later it turns out that rural produce sold in the same town contains similar levels of heavy metals.

There is little information available that allows comparison of the global burden of disease for each of the categories of health risks mentioned above.

Most of the available data are of the snap shot type and there are few longer term studies available, which would enable the assessment of the impacts of accumulation over time (e.g. for heavy metals).

Little of the available literature can assist in the formulation of adequate policies to mitigate the health and environmental risks associated with urban agriculture and there are even fewer studies that monitor and evaluate the impacts realised by such policy measures and their cost efficiency.

In order to be able to formulate adequate policies, more research has to be undertaken that specifies:

- The environmental conditions under which health problems related to urban agriculture occur (i.e., type of agriculture, farm management practices, characteristics of the location, etc.)
- The groups that are most vulnerable to those impacts and the factors that determine this vulnerability (e.g. poverty, gender, age, main occupation).
- The factors that currently restrict the urban poor from engaging in less risky agricultural and food practices
- The resources and technical capacity available in cities to implement risk mitigating policy measures.

It is suggested that city authorities make Health Impact Assessments (HIA) of urban agriculture policies and projects in order to provide evidence-based information for decision making. During the HIA the potential health impacts of such policies and projects are carefully analysed in multidisciplinary teams, involving the direct and indirect stakeholders.

References

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Iretskaya SN & Chien SH. 1998. Comparison of cadmium uptake by five different food grain crops grown on three soils of varying pH. *Comm. Soil Sci. Plant Anal*. 30: 441–448.

Puschenreiter Markus, Hartl Wilfried & Horak Othmar. 1999. Urban agriculture on heavy metal contaminated soils in Eastern Europe. Vienna: Ludwig Boltzmann Institute for Organic Agriculture and Applied Ecology.

WHO Commission on Health and Environment. 1992. Report of the panel on food and agriculture. Geneva: WHO.

Amend, Jörg (1998). Status of soil contamination and soil fertility: the case of urban agriculture in Dar es Salaam. 20 p. Urban Vegetable Promotion Project (UVPP), PO Box 31311, Dar es Salaam, Tanzania

Supplier: Ministry of Agriculture and Co-operatives (MoA&C) and Deutsche Gesellschaft fuer Technische Zusammenarbeit (GTZ).

health and environment food security and nutrition

soil contamination; soil fertility; lead; cadmium; zinc; pH; organic matter; Tanzania

Reports on a survey in Dar es Salaam conducted by the Urban Vegetable Promotion Project (UVPP) with the aim to obtain more information on soil contamination and soil fertility on its project sites. Generally, the contamination with lead and cadmium was very low. The highest concentrations, still below threshold values, were found along a major artery road. Zinc however might cause some problems in some areas. The highest concentrations were found in an area previously used as a dumpsite. Soil fertility was generally good due to constant provision of organic manure. (NB)

Asomani-Boateng, R; Haight, Murray **(1999). Reusing organic solid waste in urban farming in African cities: a challenge for urban planners. In: Agriculture urbaine en Afrique de l'Ouest: une contribution à la sécurité alimentaire et à l'assainissement des villes - Urban agriculture in West Africa: contributing to food security and urban sanitation / Olanrewaju B. Smith (ed.), p. 14 p. School of Urban and Regional Planning, University of Waterloo, Ontario, Canada**

waste recycling health and environment

waste management; composting; wastewater reuse; urban planning; Africa; organic wastes; solid wastes; waste reuse

Describes urban farming systems based on reuse of organic waste and examines possibilities and constraints in the light of urban planning. Apart from health hazards and economics related to production cost, which can be high as compared to

chemical fertiliser if production uses inappropriate technology, official attitude towards urban farming is often negative. Solutions are to be found in proper planning of waste reuse including all stakeholders involved and in source separation. (WB)

Ayres, RM; Mara, D.D **(1996). Analysis of wastewater for use in agriculture: a laboratory manual of parasitological and bacteriological techniques. World Health Organization: Geneva.**

wastewater reuse health and environment

zoonoses; health; wastewater; environment

The first step that needs to be taken by any local jurisdiction or medium to large scale urban food producer using irrigation is analysis. This volume covers the parasites and bacteria; other tests are needed to define the nutrient content. (JS)

Bellows, Anne C **(1999). Urban food, health, and the environment: the case of Upper Silesia, Poland. In: For hunger-proof cities: sustainable urban food systems / Mustafa Koc, Rod MacRae, Luc JA Mougeot and Jennifer Welsh (eds), p. 131-135. ISBN 0_88936_882_1. CAD 35.00. International Development Research Center (IDRC), PO Box 8500, Ottawa, Ontario, Canada K1G 3H9 Supplier: International Development Research Centre (IDRC), Publications Department, PO Box 8500, Ottawa, Ontario, Canada K1G 3H9**

health and environment food security and nutrition city ecology

Poland; health; ecology; access to food; crisis response; organic agriculture; education

Allotment gardening is typically conducted by women, retirees, and other reserve labour. This local production has provided a measure of shelter from the vagaries of inefficient production and food distribution (typical of centralized socialist states) and from inaccessibly high food prices, compounded by unemployment (typical of market systems). However, the yields and safety of local food labour can be reduced in severely polluted regions. The case study from Gliwice, in Upper Silesia, southwest Poland, discusses (1) organizing an acquisition, labeling, and distribution system for retailing chemically tested organic products, linking farmers to consumers; (2) distributing chemically tested produce directly to schools and hospitals and creating subsidies for their purchase; and (3) educating community groups about food contamination and the benefits of organic and farming. (Abstract adapted from original)

Bengtsson, Bengt-Erik; Bongo, Juvy P; Eklund, Britta **(1999). Assessment of duckweed (Lemna aequinoctialis) as a toxicological bioassay for tropical environments in developing countries. In: Ambio vol. 28 (1999) no. 2 p. 152-155. 4 p.**

health and environment

duckweed; bioassays; environmental impact assessment; heavy metals; environmental contamination

Informs about the use of duckweed (Lemna aequinoctialis) for carrying out bioassays. Effects of heavy metals on the growth of two strains of duckweed were tested, observing differences between the various metal ions as to toxicity. (WB)

Birley, MH; Lock, Karen **(1997). A review of the health impacts of periurban natural resource development. On: http://www.liv.ac/~mhb/publicat/periurban/start.html. 14 p. Department for International Development (DFID), Natural Resources Systems Programme, 94 Victoria Street, London, SW1E 5JL, UK.**

health and environment rural-urban linkages
health hazards; natural resource management

Describes findings of a study to identify kinds of health hazards that natural resource managers, researchers and users should be aware of. The article gives numerous cases and health survey figures. (WB)

Birley, MH; Lock, Karen **(1999). The health impacts of periurban natural resource development. 185 p. ISBN 0-9533566-1-2. Liverpool School of Tropical Medicine, Pembroke Place, Liverpool, L3 5QA, UK**

health and environment rural-urban linkages
periurban areas; health hazards; natural resource management; diseases; health impact assessment

This important monograph is based on a report commissioned by the UK Department for International Develaopment (DFID), which is conducting research into natural resources in periurban areas through its Natural Resource Systems Programme. In this study, the various health hazards in connection with the periurban interface are identified and systematically examined. Health issues are organised into categories of communicable diseases, non-communicable diseases, injury, malnutrition and psychosocial disorder. In a way, periurban communities may have to face the worst of two worlds, being subject to both traditional and modern health hazards. All major natural-resource-management themes in the periurban setting are closely examined, such as energy, agriculture, fisheries and waste management. The authors, however, do not stop at this examination but also provide techniques for safeguarding health. Also, a procedure for health impact assessment is described which can be used in project design and operation. The final chapters provide a synthesis of important linkages and give a state-of-the-art overview of researchable themes that require collective, natural resource-, social- and health-specialist inputs. Highly recommended reading for an audience of non-health specialists, such as managers of NRM projects, researchers and recipients of development aid. It contains a well-stocked bibliography on urban-health research. (WB - from executive summary)

Blumenthal, U.J. **(1992). A study of the health impact of the use of wastewater in**

agriculture in Mexico. London School of Hygiene and Tropical Medicine: London.

wastewater reuse health and environment

health; Mexico; livestock

Mexico has a very special historical record in the application of municipal sewage effluent to field crops for livestock and human consumption. This study is one of several that begin to define the benefits and costs from a rather narrow epidemiological point of view. (JS)

Blumenthal, U.J.., Mara, D.D., Peasey, A., Ruiz-Palacios, G., Stott, R. **(2000) Using treated wastewater: recommended changes to WHO guidelines. In: *Urban Agriculture Magazine*, no 3, Health , March 2001, RUAF, Leusden The Netherlands.**

health and environment wastewater reuse

Measurement; indicators; health impact assessment; policy; WHO

Standards for wastewater reuse in many countries have been influenced by the WHO (1989) health guidelines and the USEPA/USAID (1992) guidelines (which are much stricter). The WHO guidelines are proposed as a guide for policy makers as to what wastewater treatment processes, crops and irrigation methods are appropriate for safe agricultural production. They are not meant as standards for daily water monitoring at a local level. The WHO guidelines recognise the benefits that can be gained from using appropriately treated wastewater in agriculture, and aim to promote safe use of wastewater, and take into account the social, epidemiological and economic conditions that occur in specific countries. Standards are set for microbiological indicators of faecal pollution: faecal colifom bacteria and for nematode eggs. The former are intended to protect exposed persons from bacterial and viral infections (e.g salmonella) and the latter, from helminth (and protozoal) infections. WHO are currently revising the 1989 guidelines. This paper summarises the main recommendations for of a review of epidemiological, microbiological and risk assessment studies and their implications for the WHO guidelines. The article gives recommendations for changing the guidelines and proposes appropriate wastewater treatment methods that can be used to achieve the new microbiological guideline limits. The results of the WHO official review should be available in early 2002.

Borrini, G **(1992). Environment and health as a sustainable state: concepts, terms and resources for a primary health care manager in developing countries. 314 p. International Course for Primary Health Care Managers (ICHM) at District Level in Developing Countries, Instituto Superiore di Sanità (ISS), Viale Regina Elena 299, 00161 Rome, Italy; Italian Ministry of Foreign Affairs**
Supplier: ICHM / ISS, Rome, Italy

health and environment

appropriate technology; environmental health; health care; impact analysis; primary health care; resource management; sustainability

This reference tool is intended for people involved in preventative approaches to health care who have discovered that this cannot be separated from sustainable management of natural resources. It contains a glossary of basic terms dealing with environmental issues relevant to developing countries. It includes checklists for appropriate technology, environmental health impact assessment, and conditions for success in Primary Environmental Care. There is also a guide to journals, publications and institutions dealing with health, ecology and development. This is an unusual attempt to bridge disciplines of health and environment, including agroecology. (AWB)

Bradley, David **et al (1991). A review of environmental health impacts in developing country cities UNCHS/UMP Nairobi, 58 pages, 13 tables, references**
health and environment
health; urbanisation; environment

This report reviews over 100 studies to find similarities in environmental health impacts in cities in diverse situations. It aims to develop a taxonomy and proposes future research. (JS)

Brock, Berend **(1999). Actual and potential contribution of urban agriculture to environmental sanitation: a case study in Cotonou. In: Agriculture urbaine en Afrique de l'Ouest: une contribution à la sécurité alimentaire et à l'assainissement des villes = Urban agriculture in West Africa: contributing to food security and urban sanitation / Olanrewaju B. Smith (ed.). University of Amsterdam, The Netherlands**
health and environment
horticulture; ornamental plants; staple crops; wastewater management; solid waste management; land use planning; soil fertility

The contribution of vegetables, ornamental plants and staple crops to waste management was examined using participatory methods. All production activities had positive and negative impacts on the drainage system and its environmental planning approaches. Evidence of current and potential contributions to solid and liquid waste management is provided. (NB)

Brown, Kate H; Jameton AL**.(2000). Public health implications of urban agriculture. In: Journal of Public health Policy Vol. 21 (1) p. 20-39**
health and environment
health; gardening; food security; community; environment

The article presents the case for stronger public policies in support of urban agriculture as a means to improve public health. It considers several beneficial aspects of urban horticulture including: (i) food security, (ii) community economic development, (iii) physical exercise, (iv) community socio-psychological well-being and (v) environmental stewardship. It also considers the negative public health

impacts of urban agriculture and suggests policies to ameliorate them. In balance, urban horticulture is found to have potential as an important public health intervention. (JS adaptation of the authors)

Burleigh, J.R. and Black, L.L. **(2001) Supporting Farmers Towards Safe Year-round Vegetables in Manilla. In: *Urban Agriculture Magazine*, no 3, Health , March 2001, RUAF, Leusden The Netherlands.**

health and environment horticulture

Philippines; AVRDC; IPM; agrochemicals

AVRDC collaborates with the Central Luzon State University-Philippines, the Bureau of Plant Industry-Philippines, and the Technical University of Munich-Germany in a project entitled “Development of periurban vegetable production systems for sustainable year-round supplies to tropical Asian cities”. The project aims to design, test and implement production systems for sustainable year-round supplies of vegetables to markets in Metro Manila - and by model verification, to other tropical Asian cities as well. This article focuses on part of the work of the periurban vegetable production project, which is to decrease the ubiquitous use of pesticides in periurban Manila through introduction of IPM techniques.

Commission on Health and Environment, World Health Organisation (WHO) **(1992). Food and agriculture. In: Our planet, our health: report of the WHO Commission on Health and Environment, p. 60-105. ISBN 92-4-156148-3. Commission on Health and Environment, World Health Organisation (WHO), Geneva, Switzerland**

health and environment food security and nutrition

public health; health hazards; nutritional requirements; agricultural chemicals

Overview paper of the way environment influences human health and well-being. This chapter focuses particularly on the role agriculture plays. Figures are presented on a variety of parameters, such as the relationship between health and dietary intake. Different food contamination sources are listed and examined. In addition, there are paragraphs on occupational hazards and accidents, notably in connection with agricultural chemicals. At the end, recommendations are given for policy development and research on health and environmental effects of current trends in food consumption and agricultural production. (WB)

Deutsche Stiftung fuer Internationale Entwicklung (DSE); German Agency for Technical Cooperation (GTZ) **(1989). Community participation and hygiene education in water supply and sanitation. Deutsche Stiftung fuer Internationale Entwicklung (DSE); German Agency for Technical Cooperation (GTZ), PO Box 5180, D-65726 Eschborn 1, Germany**

wastewater reuse health and environment community development

community participation; water management; sanitation; development projects; indicators

Successful water and sanitation projects should have a community participation and hygiene education component. These aspects are addressed in this manual containing five individual course manuals, designed to be used separately, as the foreword puts it, 'for guidance and as a frame of reference in water and sanitation projects for national and international decision makers; and for field managers of water supply and sanitation projects'. This manual constitutes a great attempt to bring together and analyse this complex material. (WB)

Diop Gueye N.F. and Sy M. **(2001) The use of wastewater for urban agriculture; the example of Dakar, Nouakchott and Ouagadougou. In: *Urban Agriculture Magazine*, no 3, Health , March 2001, RUAF, Leusden The Netherlands.**
health and environment wastewater reuse
West Africa

In the Sahelian zone water is the major stumbling block to developing agricultural activities, In the cities domestic needs win out over agricultural activities in the competition for water. Given this, it becomes evident that one strategy to offset the water deficit is to reuse wastewater. Such a practice has to be examined closely for its advantages and disadvantages in relation to the issue of urban and periurban agriculture. In this article an overview of constraints and opportunities is given.

Drangert, Jan-Olof; Bew, Jennifer; Winblad, Uno **(eds) (1997). Ecological alternatives in sanitation: proceedings from SIDA Sanitation Workshop, Balingsholm, Sweden, 6-9 August 1997. Publications on Water Resources no. 9. ISBN 91_586_7551_5. Department for Natural Resources and the Environment, Swedish International Development Authority (SIDA), Birger Jarlsgatan 61, S-10525 Stockholm, Sweden**
waste recycling wastewater reuse health and environment
sanitation; workshops; disease control; water management

This sanitation workshop was organised with the need to rethink and with new approaches and techniques in sanitation in mind. This document provides a comprehensive overview of ecological sanitation. Aspects like reuse and disease control are discussed. Within ecological sanitation there are a range of options for various conditions. Furthermore, case studies from several countries in the world and abstracts of background papers to the conference are included. (NB)

Drechsel, P.; Kunze, Dagmar **(1999). International Workshop on Urban and Periurban Agriculture, 2-6 August 1999, Accra, Ghana. Urban Agriculture Notes http://www.cityfarmer.org/africaworkshop.html. 8 p. IBSRAM Regional Office for Africa, Ghana; FAO Regional Office for Africa, Ghana**
Supplier: City Farmer, Canada's Office of Urban Agriculture
health and environment waste recycling economic impact
food security; environment; West Africa; health; urban planning; economic aspects

Concisely presents the results of the International Workshop on Urban and Periurban Agriculture in Accra. The main theme of the conference was Closing the nutrient cycle for urban food security and environmental protection. Within this theme four sub-theme were distinguished with background papers and working groups: (1) Environment and public health; (2) Nutrient recycling; (3) Policy, Planning and Economics; (4) Farmers' point of view. For these themes priority actions and main constraints were identified. (NB)

Drechsel, P.; Kunze, Dagmar (eds) **(2001) Waste composting for urban and periurban agriculture: closing the rural-urban nutrient cycle in sub-Saharan Africa. ca 200 p. ISBN 0-85199-548-9. CABI, Wallingford, UK; IBSRAM Regional Office for Africa, Ghana; FAO Regional Office for Africa, Ghana**

health and environment waste recycling economic impact

Rapid urbanisation has created a major challenge with regard to waste management and environmental protection. However, the problem can be ameliorated by turning organic waste into compost for use as an agricultural fertiliser in (peri-)urban areas. The forthcoming CABI hardcover (May/June 2001) provides an African perspective on potential and constraints of urban waste recycling for soil amelioration (and integrated pest management) as well as on urban and periurban farming systems as beneficiaries. Most papers derived from an IBSRAM - FAO workshop held in Ghana in August 1999 with authors from several European, as well as African, countries, representing various disciplines. The book will appeal to a readership in soil science, urban and rural planning, environmental science, waste management, developing studies and farming systems.

Contents include:

- Potential use of waste stream products for soil amelioration in periurban interface agricultural production systems
- Economic, sociocultural and environmental considerations
- Turning urban waste into fertilizer: Case studies from East and West Africa
- Modelling urban and periurban biomass and nutrient flows
- Urban agriculture: International support and capacity building in Africa

(PD)

Deutsche Stiftung fuer Internationale Entwicklung (DSE); German Agency for Technical Cooperation (GTZ) **(1989). Community participation and hygiene education in water supply and sanitation. Deutsche Stiftung fuer Internationale Entwicklung (DSE); German Agency for Technical Cooperation (GTZ), PO Box 5180, D-65726 Eschborn 1, Germany**

wastewater reuse health and environment community development community participation; water management; sanitation; development projects;

indicators

Successful water and sanitation projects should have a community participation and hygiene education component. These aspects are addressed in this manual containing five individual course manuals, designed to be used separately, as the foreword puts it, 'for guidance and as a frame of reference in water and sanitation projects for national and international decision makers; and for field managers of water supply and sanitation projects'. This manual constitutes a great attempt to bring together and analyse this complex material. (WB)

Edwards P**. (2001) Public Health issues of waste water-fed aquaculture. In: *Urban Agriculture Magazine*, no 3, Health , March 2001, RUAF, Leusden The Netherlands.**

health and environment wastewater reuse
India; aquaculture

Fish farmed in wastewater-fed ponds provide nutritious and relatively safe food for the urban poor. In spite of most systems being developed by farmers with limited attention to either wastewater treatment or to public health, potential threats from disease causing organisms and chemical contaminants from industrial effluents are mitigated by various mechanisms. Recommendations are made by the author to further safeguard public health.

Esrey, Steve **et al (1998). Ecological sanitation. SIDA, Stockholm, Sweden. 92 p.**

wastewater reuse health and environment waste recycling
ecology; sanitation; sewage; human excreta; pollution

This short volume is focussed on providing a practicable vision of a future of ecological sanitation. It presents the theory, the history (back to the Ancients), design principles and promotion strategies. This is an excellent introduction to the precepts of eco-sanitation and its relationship to urban agriculture, public health, and healthy city and a sustainable city. (JS)

Esrey, Steve and Andersson, I**. (2001) Ecological Sanitation - Closing the Loop. In: *Urban Agriculture Magazine*, no 3, Health , March 2001, RUAF, Leusden The Netherlands**.

health and environment waste recycling city ecology
sanitation

Today, half of humanity does not have access to any type of sanitation. This is a fundamental denial of human dignity and threatens human well-being. The rest of humanity relies on conventional approaches to sanitation, which fall into one of two categories: waterborne systems and pit latrines. Both “flush and discharge” and “drop and store” technologies were built on the premise that the nutrients we excrete have little value, and the waste is suitable only for disposal. Consequently, the environment is polluted, nutrients are lost, and a wide array of health problems

result. The authors argue that a different approach is needed to both sanitation and agriculture. The approaches are non-polluting, rely on biological processes, recycle nutrients, and can be safe and effective in promoting health and nutritional well-being. Ecological sanitation is given here as a representation of that shift in the way people think about and act upon human excreta.

EURO-URBANUT (EUN) **(1998). urban food and nutrition security: WHO action plan for vulnerable groups. 8 p.**
food security and nutrition health and environment
political aspects; urban food; nutrition

Contains elements of a description of a WHO urban food and nutrition Action Plan aimed at supporting, protecting and promoting the consumption of vegetables and fruit. (WB)

Feacham, RG et al. **(1983). Sanitation and disease: health aspects of excreta and wastewater management. Wiley, New York.**
wastewater reuse health and environment
epidemiology; sanitation; water management; health

This volume provides a historical base for considering the possible negative effects of reusing sewage effluent for nutritional, recreational and environment enhancement in and near human settlements. It follows Feacham's seminal work in the field at the "Cholera Laboratories in Dhaka Bangladesh. (JS)

Floquet, Anne**. Potentials and perils on (sic) periurban agriculture in a West African coastal region. Symposium 'Rural Farming Systems Analysis: Environmental Perspectives'. Workshop E: farming and rural systems in zones of transition. Paper E/6 p. 446-456. University of Hohenheim, Germany**
horticulture health and environment
West Africa; Benin; periurban agriculture; environmental degradation; rural-urban migration

Market demands change quickly in West Africa as a result of fast-growing cities. The underlying paper describes the situation in Benin, where farmers from the south have largely failed to grasp the opportunity of the urban consumption market. Soil mining has led to a decrease in the production of staple food and fuelwood in the South of Benin and to soil depletion, with ensuing rural exodus. Based on six years of field research, changes in cropping and farming systems and socio-economic changes, in the light of a rapidly changing environment, are described in this paper. (WB)

Furedy, Christine**. (2001) Reducing health risks of Urban Organic Solid Waste Use. In: *Urban Agriculture Magazine*, no 3, Health , March 2001, RUAF, Leusden The**

Netherlands.
health and environment waste recycling community development
India; health risk management, organic wastes, compost, informal practices, community-based composting, composting.

Health concerns received minimal attention at the beginning of the recent thrust to promote urban and periurban agriculture, but progress has been made recently in articulating the health issues, especially in developing countries. Some aspects of the risks of urban organic solid waste reuse are discussed in this paper. The focus in this article is the relation of health risk management to informal or community-based practices, with particular reference to composting and the use of decomposed organic wastes. Because the capacity of governments to intervene in most urban agriculture related activities is limited, it is argued that a gradual progress in self-regulation or self-limitation of risks is necessary and external assistance is needed for assistance with setting appropriate standards, promoting practical measures and stimulating research.

Flynn, Kathleen**. An overview of public health and urban agriculture: water, soil and crop contamination and emerging urban zoonoses. Cities Feeding People Series Report no. 30. 84 p.**
Supplier: International Development Research Center (IDRC), PO Box 8500, Ottawa, Ontario, Canada K1G 3H9
health and environment wastewater reuse

Furedy, Christine; Maclaren, Virginia; Whitney, Joseph **(1999). Reuse of waste for food production in Asian cities: health and economic perspectives..In: For hunger-proof cities: sustainable urban food systems / Mustafa Koc, Rod MacRae, Luc JA Mougeot and Jennifer .Welsh (eds), p. 136-144. ISBN 0_88936_882_1. CAD 35.00**
Supplier: International Development Research Centre (IDRC), Publications Department, PO Box 8500, Ottawa, Ontario, Canada K1G 3H9
waste recycling health and environment
organic waste reuse; health; aquaculture; economic impact; education

Asian communities have many practices involving the reuse of organic wastes in agriculture and aquaculture, even in urban areas. This paper discusses health and economic aspects of the reuse of municipal waste in South and Southeast Asia. Recent research in Bangkok, Bandung, Bangalore, Hanoi, Ho Chi Minh City, Jakarta, and Manila is used to suggest the potential for the linking organic waste reuse and urban agri-aquaculture. Important constraints on the reuse organic waste are contamination and the greater cost of making compost compared to chemical fertilizers. The paper suggests strategies for minimizing these constraints and improving the marketability of organic wastes. Contamination can be reduced by collecting waste separately and by separating organics at source. Market research is needed to promote the use of compost. Health risks can be reduced through education and the amendment of agricultural practices. (Abstract adapted from

original)

Gaynor, A. **(2001) Pesticide soil contamination: a case study from Perth Western Australia. In: *Urban Agriculture Magazine*, no 3, Health , March 2001, RUAF, Leusden The Netherlands.**
health and environment
pesticides

The safety of food produced by urban agriculture depends on a number of factors. One of these factors is prior land uses, including the history of persistent toxic chemicals applied to an area. Using the case study of the Argentine Ant eradication programme carried out in Perth, Western Australia, from 1949 to 1988, this article examines the problems that can arise when urban agriculture is scattered throughout a metropolitan area, and carried out by people who often have little detailed knowledge of the history of land uses in the area. The article concludes with recommendations for health and local government workers, which could help to ensure that householders are aware of the potential health risks associated with food production in urban areas, and are able to act to minimise those risks.

Ghosh, Rohini and Premananda Bharati **(2001), Sociocultural, Maternal Factors and Mortality of Underfive Children of Two Ethnic Groups in a Peri-Urban Habitat in Kolkata, West-Bengal , India. Indian Statistical Institute, Kolkata. Paper prepared for the DPU International Conference: Rural-Urban Encounters: Managing the Environment of the Peri-Urban Interface, London 9-10 November 2001**
health / pollution rural-urban linkages
periurban area; children's health; India; cultural aspects, Asia (South-Central)

The present study aims to investigate how sociocultural and maternal factors relate to childhood mortality differentials in two culturally different populations in a Peri-Urban situation at household or micro-level and to find out the factors that are associated with underfive mortality in the study area and suggest appropriate health interventions or programs.

Hardoy, Jorge E.; Satterthwaite, David **(1997). Health and environment and the urban poor. In: Gurinder S. Shahi, Barry S. Levy, and Todd Kjellström (Eds.) International Perspectives on Environment, Development and Health; Towards a Sustainable World. - pp123-162. New York: Springer Publishing Company Inc.**
health and environment

This paper looks at an array of health problems associated with urban environments in the South. The authors draw attention to the geography of inequality in the aspects of human and environmental health which have differential impacts according to age, sex, gender roles and migrant status. The authors argue that the

people most vulnerable to environmental hazards are those least able to avoid them. Of particular interest for urban agriculture is the focus on chemical and industrial pollutants in urban areas. The authors mark chemical pollutants as one of the four most pressing urban environmental concerns. They claim that reports from Third World cities of severe health problems arising from human contact with toxic or hazardous wastes are increasingly common. (Kathleen Flynn)

Hooft, K van 't**. (2000) Cisticercosis, a Complex Zoonotic Disease. In: *Urban Agriculture Magazine*, no 2, urban livestock, October 2000, RUAF, Leusden The Netherlands.**

urban livestock health and environment

zoonoses; Bolivia; Cisticercosis

Cisticercosis is one of the most dangerous diseases caused by a parasite that passes from animals to human beings. It is most prevalent in developing countries, and is closely related to economic standard, culture, hygiene, and the way animals and people share the same living space. Major problems with this disease exist in Latin America, and in the non-Islamic parts of Africa and South East Asia, especially India. This article describes the case of cisticercosis that originates from pigs (Cisticercosis cellulosae) with reference to Bolivia, South America.

Huamain, Chen **(et al.) (1999). Heavy metal pollution in soils in China: status and countermeasures. In: Ambio vol. 28 (1999) no. 2 p. 130-134**
Supplier: Swedish University of Agricultural Sciences, Department of Ecology and Environment, PO Box 7072, S-750 07 Uppsala, Sweden

health and environment

heavy metals; pollution; soil contamination

Heavy metal pollution of soil greatly affects not only the yield and quality of crops, animal and human health, but also the quality of the whole environment. The current status and the effects of heavy-metal pollution in China are reviewed in this paper. Soil pollution by heavy metals from sewage irrigation and metal mining, smelting and processing activities was seen to be serious. Urban enterprises also contribute to heavy metal pollution of soils in China. The effects of soil pollution on plants, animals and human beings are discussed. Effective countermeasures for pollution control are also presented. (Kathleen Flynn)

International Food Policy Research Institute (IFPRI) **(2000). The life cycle of malnutrition: eradicating malnutrition: income growth or nutrition programs? International Food Policy Research Institute. 70 p.**

food security and nutrition health and environment

malnutrition; food policy; urbanisation; food security; gender; livestock; land tenure

This annual report of a CGIAR center is focussed on the role of good nutrition in economic growth and well-being. It finds that community-based nutrition programs

bring multiple benefits. It begins with the statement that Malnutrition is not a disease that runs its course. It is a process, with consequences that may extend not only into later life, but also to future generations. Currently about one in thee children under five in the developing world are malnourished, and one in two in eastern Africa. The potential gains of improved nutrition are identified as massive beginning with increased adult productivity, continuing through reduced health care costs, and promoting both social and civic well-being. Significantly, IFPRI finds that poverty and malnutrition are not congruent. More money may not lead to better food, care and health if good food is not available and accessible. Better nutrition is proven to raise incomes but higher income is not a guarantee of better nutrition and health. (JS)

Klein, Petra; Steen, Anniek **(1999). Urban agriculture: a review of the literature on the sociological and nutritional dimensions of urban agriculture in East Africa. 55 p. ETC International, PO Box 64, 3830 AB Leusden, The Netherlands**
food security and nutrition community development health and environment
Kenya; Uganda; Tanzania;; food security; nutrition; social aspects; urban livelihoods; health hazards; home gardening

In the framework of a literature study, this paper reviews a number of publications looking at sociological and nutritional aspects of urban agriculture, mainly in Nairobi, Kampala and Dar es Salaam. (WB)

Lang, Tim **(1997). The public health impact of globalisation of food trade. In: Diet, nutrition and chronic disease: lessons from contrasting worlds / Prakas S Shetty and Klim McPherson (eds). London School of Hygiene and Tropical Medicine. ISBN 0-471-97133-2. Centre for Food Policy, Wolfson School of Health Sciences, Thames Valley University, London, UK**
health and environment
nutrition; food security

This article contains an analysis of the implications of the GATT agreement of 1994 on food security, agriculture, consumption patterns and public health. The argument demystifies assumed benefits of the liberalisation of markets and the inclusion of agriculture in trade liberalisation. (NB)

Lewis, Charles **(1979). Comment: healing in the urban environment: a person / plant viewpoint. In: APA Journal Vol. July 1979 p. 330-338.**
health and environment
home gardening; urban livelihoods; psychological factors; human well-being

Reports on the socio-economic benefits of gardening in low-income areas in North America. Also, the articles focuses on livelihood and factors influencing the human sense of well-being in which vegetation plays a crucial role, so the author argues. (WB)

Lines, Joe; Harpham, Trudy; Leake, Colin; Schofield, Chris**. Trends, priorities and policy directions in the control of vector-borne diseases in urban environments. In: Health Policy and Planning 9(2) pp113-129**
health and environment
health; disease control; policy; urban environment

This review describes how the physical and social changes associated with urbanisation have altered the transmission of vector-borne disease. It concentrates on the important mosquito-borne infections: malaria, dengue and filariasis. Dengue virus vectors breed in relatively clean water in man-made containers, while urban filariasis vectors breed in highly polluted water, and these mosquitoes have now been spread by human activity to almost every tropical city. The authors point out that with important exceptions, anopheline malaria vectors have not generally succeeded in adapting to urban life, but malaria can still be a problem where there are rural pockets in the middle of town. They specifically cite African cities as an area of potential risk because they tend to be relatively open, with patches of abandoned land and cultivation close to the centre. (Joe Lines)

Lock, Karen and Veenhuizen, R. van **(2001) Balancing the Positive and Negative Health Impacts of Urban Agriculture. In: *Urban Agriculture Magazine*, no 3, Health , March 2001, RUAF, Leusden The Netherlands.**
health and environment
health impact assessment; policy

This is the editorial to this issue of the Urban Agriculture Magazine on Health. Next to an overview of the discussion - in which emphasis is given to the positive impact of urban agriculture on the health situation of urban citizens, and an overview of the article contributions, the authors give an introduction into Health Impact Assessment.

Lukman, Salifu**. Waste management issues: an integrated disposal strategy for the Kumasi metropolitan area. Waste Management Department, Kumasi Metropolitan Assembly, Ghana**
waste recycling wastewater reuse health and environment
Ghana; waste management; wastewater management; urban sanitation

Urban sanitation and waste management are given a priority by all district and municipal governments in Ghana. However, the waste management capacity of cities is deteriorating. This paper discusses the solid and liquid waste management system of Kumasi. Needs assessment and intervention schemes are presented. From there, proposals for strategies for sustainable services delivery and an integrated disposal strategy including a reality check are made. (NB)

Mantovani, A. **(2000) Veterinary Urban Hygiene in Developing Countries. In: *Urban Agriculture Magazine*, no 2, urban livestock, October 2000, RUAF,**

Leusden The Netherlands.
urban livestock health and environment
zoonoses; WHO; policy

The World Health Organization (WHO) and its branch, the Veterinary Public Health (VPH) initiated officially to develop its interests for the problems connected with urban areas in 1977, dedicating to the subject conspicuous energies. The subject (i.e. the veterinary action in urban areas) was denominated Veterinary Urban Hygiene (VUH). VUH has developed differently in the various countries, ranging from a maximum of activities (e.g. in Italy, in which the public veterinary services belong totally to the health administration, and perform all public veterinary responsibilities), to a minimum, in which few limited activities (generally some rabies control) are performed. This article gives an overview of zoonoses and the actions taken.

Mawoneke, Sthembile **(1998). Impact of the urban agriculture research study in Zimbabwe. ENDA Zimbabwe, Box 3492, Harare, Zimbabwe**
economic impact food security and nutrition health and environment
Zimbabwe; economic impact assessment; food security; off-plot cultivation; health hazards; heavy metals

Reports on the results of a household monitoring study aiming at determining the economic impact of urban agriculture on urban households in Harare, Zimbabwe, assessing the nutritional impact of agricultural produce on urban households; and identifying crop types and off-plot cultivation. Simultaneously, environmental research was conducted focusing on assessing the impact of urban agriculture on the urban environment. (WB)

Maxwell, Daniel G.; Armar-Klemesu, Margaret **(1998). The impact of urban agriculture on livelihood, food and nutrition security in Greater Accra. 30 p. Nutrition Unit, Noguchi Memorila Institute for Medical Research, University of Ghana, PO Box 25, Legon, Ghana**
food security and nutrition economic impact health and environment
food security; Ghana; Accra; nutrition; livelihoods; health; environment; land use systems; food contamination; gender; multi-disciplinary approach; institutional aspects; human resource development; farming systems

Part one of the paper summarises the major findings of the urban agriculture component of the overall study. The geographic, demographic, and socio-economic distribution of urban agriculture in Accra is presented. The impact of urban agriculture on food and livelihood security and nutritional status at household level and individual level are discussed as well as the environmental impacts and the impacts on health. An analysis is made of how city growth affects land use, property rights and livelihoods on the urban fringe. Finally, various other areas like human resource development, institutional strengthening, local partnerships gender are discussed. (NB)

McGranahan, G., P. Jacobi, J. Songsore, C. Surjadi and M. Kjellen **(2001), The**

Citizens at Risk: From Urban Sanitation to Sustainable Cities. Stockholm Environment Institute. Supplier: Earthscan Publications Ltd, 120 Pentonville Road, London, N1 9JN, UK

health / pollution city ecology

ecology; developing countries; urban ecology; pollution; urban areas; sustainable development; environmental policy, Africa (Central), Africa (Eastern), Africa (Northern), Africa (Southern), Africa (Western), America (Central), America (Southern)

Taking a comparative look at cities in Africa, Asia and Latin America, the book examines: the changing nature of urban environmental risks; the rules governing the distribution of such risks and their differential impact; and how the risks arise and who is responsible. The authors describe the most pressing urban environmental challenges, such as improving health conditions in deprived urban settlements, ensuring sustainable development in a globalising world, and achieving environmental justice along with the greening of development. They argue that current debates on sustainable development fail to come to terms with these challenges, and call for a more politically and ethically explicit approach.

Muchaal P**. (2001) Zoonoses of Dairy Cattle, with reference to Africa. In: *Urban Agriculture Magazine*, no 3, Health , March 2001, RUAF, Leusden The Netherlands.**

health and environment urban livestock

West Africa; zoonoses; dairy;

Zoonoses are infections naturally transmitted between vertebrate animals and humans,either directly, or indirectly through consumption of contaminated foods.Traditional zoonotic diseases for which effective control measures and cures are available in affluent countries, are still a cause of morbidity and mortality in humans and animals in developing countries. Increasing urbanization, the growth of livestock production in close proximity to humans, the rising rate of HIV, inadequate hygienic practices, and cultural customs and beliefs exacerbate the transmission, persistence and impact of zoonotic diseases in these regions. This article is a literature review focusing on West Africa.

Mwangi, Alice Mboganie; Foeken, Dick **(1996). Urban agriculture food security and nutrition in low income areas in Nairobi. In: African Urban Quarterly vol. 11 no. 2-3 p. 170-179. Unit of Applied Nutrition, University of Nairobi, PO Box 30197, Nairobi, Kenya ; African Studies Centre, PO Box 9555, 2300 RB Leiden, Netherlands**

food security and nutrition health and environment

food security; Kenya; children's health

Addresses the issue to what extent farming activities by low income urban dwellers within the city boundaries of Nairobi play a role in the food security and nutritional condition of the households involved. A comparison is made between three low income groups, i.e. those who practise urban farming, those who do not, and finally a group involved in an urban farming project. The results show that as far as food

security is concerned, urban farming does play a role, but also that this is not translated into a better nutritional condition of the children. (WB - from the original abstracts)

Nugent, Rachel A **(2000). The impact of urban agriculture on the household and local economies. In: Growing cities, growing food: urban agriculture on the policy agenda, p. 76-97. DSE, GTZ, CTA, SIDA**
economic impact food security and nutrition health and environment
household economy; local economy; employment; income generation; labour markets; gender; economic diversification; urban policies; macro-economic impacts

On basis of the case studies presented in the reader the article analyses the economic impact or urban agriculture on individual, household, city and macro-economic level. The paper explores the economic conditions and policies in urban areas that create the impetus for urban agriculture to exist and which affect its viability. The capacity of urban agriculture to provide jobs and income and value of production are analysed, which all are badly needed in fast growing cities. Conclusions are drawn on the economic relevance of urban agriculture based on both quantitative and qualitative knowledge. (NB)

Office for International Cooperation, Faculty of Veterinary Medicine (1996). Urbanisation: veterinary public health consequences. In: Equator: newsletter on veterinary aspects of international development cooperation Vol. 8 no. 5 p. 1-6. Office for International Cooperation, Faculty of Veterinary Medicine, Utrecht, The Netherlands
urban livestock health and environment
public health; health hazards

Reports on a symposium held at Utrecht, Netherlands, September 27, 1996. Issues addressed were: (1) veterinary public health; (2) production and consumption; (3) living in a healthy environment; and (4) animals as a source of diseases in human beings. (WB)

Parker, J Stephen **(1995). No more business as usual. Water and sanitation for all: a world priority no. 3. 96 p. International Water and Sanitation Centre (IRC), The Hague, The Netherlands**
Supplier: Ministry of Housing, Spatial Planning and the Environment, PO Box 30945, 2500 GC The Hague, The Netherlands
health and environment
water management; drinking water; public health; environmental pollution; political aspects

Addresses the water issue, so high on the international agenda. This publication highlights the fact that providing people with safe water is not so much a technical issue as a matter of political will. This publication builds further on an international Ministerial Conference on Drinking Water and Environmental Sanitation organised in

Noordwijk, Netherlands, in 1994, under the auspices of the Dutch Ministry of Housing, Spatial Planning and the Environment. The conference proceedings contained a series of six key background papers, and resulted in a Political Statement and Action Programme. The underlying publication is part of the series Water and Sanitation for All: A World Priority, containing 3 volumes, based on these conference proceedings. (WB)

Pederson, R.M.. and Robertson, A.**. (2001). Food Policies are essential for Healthy Cities. In: *Urban Agriculture Magazine*, no 3, Health , March 2001, RUAF, Leusden The Netherlands.**

health and environment food security and nutrition

Europe; policy

Food production and its retail are increasingly perceived as presenting risks to society in Europe. Consumers are more and more concerned, no longer trust and have lost confidence in the food supply. In contrast food is essential for health. Policies are therefore needed to limit its risks and promote food's assets and re-store consumer confidence. Local food policies can demonstrate the assets, and not the liabilities, of urban and periurban food production and its retail. The benefits include improved physical and mental well-being. Social benefits could accrue from increased leisure opportunities, improved cohesion within the community and decreased social exclusion. Economic benefits arise from job creation, income generation and the development of enterprises for local food production and processing and its retail. More opportunities for education, recreation, tourism, and attracting new business could be created. Environmental benefits from improvements to water conservation and supply, air quality, carbon dioxide levels, bio-diversity, waste-management and energy-saving could result from local food policies.

Pickford, John **(et al.) (eds) (1996). Sustainability of water and sanitation systems: selected papers of the 21st WEEDC Conference, Kampala, Uganda, 1995. 153 p. ISBN 1_85339_339_8. Water, Engineering and Development Centre (WEDC) Supplier: Intermediate Technology Publications, 103/105 Southampton Row, London WC1B 4HH, UK**

wastewater reuse health and environment

sanitation

The conference theme was “The sustainability of water and sanitation systems in developing countries”. Most cases presented were of a practical nature. Case studies were grouped in four sections: (1) Management; (2) Water and the environment; (3) Rural water supply and sanitation; (4) Sanitation and waste. (WB)

Reed, David **(2001), Economic Change, Governance and Natural Resource Wealth - The Political Economy of Change in Southern Africa. London/Sterling: Earthscan Publications Ltd.**

health / pollution

natural resources; management; economic aspects; natural resource management, Africa (Southern)

As the debate regarding the benefits and costs of globalization evolves this book confronts the stark realities of how economic and political reforms in southern Africa have affected the poor and the environment. It further examines the crucial role of international development and business communities in creating effective institutions for long-term, sustainable propserity and social vitality.

The analysis and recommendations presented in this book will be immensely valuable to southern Africa specialists as well as to professionals in development, policy-makers, economists and academics interested in natural resource management elsewhere in the developing world.

Riches, Graham **(ed.) (1997). First world hunger: food security and welfare politics. London: Macmillan Press Ltd. and New York: St. Martin's Press.**
food security and nutrition health and environment
malnutrition; hunger; health; policy

Chapters by resident authors on Australia, Canada, New Zealand, the UK, and the USA, plus introductory and concluding chapters by Graham Riches. A well documented overview of the anomaly of hunger in wealthy countries.(JS)

Rock, M.T. **(2001) Pollution control in East Asia: lessons from newly industrializing economies**.

health / pollution city ecology
Asia (Eastern), environmental management

Why do some economies seem to excel at effective pollution management while others seem to miss the mark when responding to deteriorating urban environments? These studies of pollution management in East Asia s newly industrialized economies (NIE s) include succesfull government responses in Singapore and Taiwan, qualified results in China and Indonesia, and much more limited success in Thailand and Malaysia. In each example Michael Rock considers the starting point of the economy as it began its path toward industrialization in the post World War II period. He discussed the relevant historical and and political context, the pressures placed on the political system from domestic and international sources, and the influence of ongoing trends in East Asia for democratization end economic liberalization. Rock s text makes it clear that each economy found unique, innovative ways to link environmental protection to its own politicaland economic institutions. Thus, while public pressure from both home and abroad gave both strong impetus to succesful programmes in Taiwan, the development of policy in Singapore involved limited public review and a centralized, government led process. The result of Rock s research is a book that provides important lessons without being reductionist. The book offers insights to apply to pollution management in a diverse range of developing nations, but it avoids attempts for precise prescription, or universally appealing, normative answers.

Rodrigues, MS; Lopez-Real, JM **(1999). Urban organic wastes, urban health and**

sustainable urban and periurban agriculture: linking urban and rural by composting. In: Urban agriculture notes, http://www.cityfarmer.org/urbanwastes.html
Supplier: City Farmer, Canada's Office of Urban Agriculture
waste recycling health and environment rural-urban linkages
organic wastes; waste management; public health; periurban agriculture; horticulture

Looks at waste management systems, and at public health as a result of poor refuse disposal. The paper also examines the absorption capacity of both urban and periurban agriculture of this organic waste. (WB)

Ruel, Marie T; Levin, Carol **(2000). Assessing the potential for food-based strategies to reduce vitamin A & iron deficiencies. IFPRI, FCND Discussion Paper # 94 PP 53, 11 pp. references, 2 tables, Washington**
health and environment food security and nutrition
nutrition; micronutrients; malnutrition; health

This paper reviews ten recent projects and library sources regarding food-based strategies to improve vitamin A and iron intake in the diet. It discusses some of the lessons learned and the knowledge gaps. It sets research priorities. Food-based strategies are often described as sustainable because they empower individuals, households, and communities to take responsibility over the quality of their diet through production of nutrient rich foods and informed eating choice. It concludes that the area of food-based interventions has been increasingly active and successful over the past decade. The design and implementation of these strategies have significantly improved. This work is largely driven by NGOs and local institutions. The study concentrates on home gardens (six of ten cases cited). These strategies are particularly well fit to urban agriculture and agriculture fore refugees and displaced persons. (JS)

Satterthwaite, David **et al (1996). The environment for children: understanding and acting on the hazards that threaten children and their parents. UNICEF & Earthscan.; 284 p.**
health and environment
sustainable development; environmental aspects; primary health care; poverty

The book presents a review of the environmental hazards in human settlements and some ideas of how to address these problems. It seeks to make explicate the influence of social, economic and political factors on why such environmental hazards occur and who is most effected by them. It draws on UNICEF projects in Human Settlements and Forestry, Land Use, Sustainable Agriculture and Drylands. It is particularly focussed on (a) ill health and premature death caused by pathogens in the environment in which we live (particularly diarrhea, malaria and intestinal parasites and (b) the environmental crisis of hundreds of millions of people who lack access to natural resources on which their health and/or their livelihood depend. The wide selection of cases (i.e. Box 4.13 *Urban Food Production in Kenya)* tables, and figures provides a solid foundation for understanding and taking action on the

problems reviewed. (JS)

Shuval, HI **et al (1986). wastewater irrigation in developing countries: health effects and technical solutions. UNDP Project Management Report No. 6, New York ,. 325 p.**

wastewater reuse health and environment

irrigation; health; stabilisation ponds; economics

This is a fairly comprehensive overview. It tells the story beginning wit the 19th century in 14 developed countries and finishes with a summary of positives and negatives. It proposes effective and economic methods of control that re particularly suited to developing countries. A theoretical model is developed based on a review of credible epidemiological studies and reports, to assist in the prediction of degree of risk of disease to sewage farm workers, neighbors to the treatment plants and to the consumers of products associated with wastewater irrigation. This study provides a rational basis for the development of a sound economic approach to waste water irrigation in developing countries. Such an approach helps to conserve water and nutrient resources, promotes urban agriculture, and contributes to pollution control. It reduces the cost of inputs to urban and periurban farmers and reduces the cost of municipalities and other local jurisdictions in waste management. This report presents a concise introduction to the policy and technological aspects of recycling wastewater from urban areas for agricultural irrigation. The focus is on conserving resources, economic development and healthy cities. It is a non-technical summary of a 324-page report (World Bank Technical Paper # 51) that was the culmination of a thee-year global study of the latest developments in the field. Several eminent review panels have concluded that the principles presented in this paper provide a sound scientific and public health basis for planning wastewater irrigation projects. (JS adapted from author)

Smith, Olanrewaju B **(1999). Agriculture urbaine en Afrique de l'Ouest: une contribution à la sécurité alimentaire et à l'assainissement des villes = Urban agriculture in West Africa: contributing to food security and urban sanitation. 240 p. ISBN 0_88936_890_2. CAD 30.00. International Development Research Center (IDRC), PO Box 8500, Ottawa, Ontario, Canada K1G 3H9; Technical Centre for Agricultural and Rural Cooperation (CTA), PO Box 380, 6700 AJ Wageningen, The Netherlands**
Supplier: International Development Research Centre (IDRC), Publications Department, PO Box 8500, Ottawa, Ontario, Canada K1G 3H9

food security and nutrition health and environment

food security; ecological aspects; economic aspects; rural-urban interaction; research methodology

Seven case studies and research papers plus reports of working groups and plenary sessions of the workshop are presented covering the following themes: policy environment, rural urban interaction, food security, urban waste management and networking in urban agriculture. Case studies on Mali, Burkina Faso, Senegal, Togo,

and Benin were presented. Opportunities and constraints of the UA sector contributions to urban food security and sanitation are analysed. (NB)

Sonou M. **(2001) Periurban Irrigated Agriculture and Health Risks in Ghana. In: *Urban Agriculture Magazine*, no 3, Health , March 2001, RUAF, Leusden The Netherlands.**

health and environment wastewater reuse

Ghana; reuse; irrigation;

Most vegetable farmers in the (peri)-urban areas of Kumasi and Accra consider irrigated horticulture as their primary sources of revenues. Currently, (peri)-urban irrigation provides all-year round vegetables and contributes to the improvement of the nutritional status of city inhabitants. The nearness of the markets means a large array of fresh products of good quality. However, water remains a qualitative and quantitative constraint. Because the cost of pipe borne water makes it unaffordable to farmers, the use of untreated wastewater for irrigation has become a widespread practice with its attendant health hazards.

Werna, Edmundo; Harpham, Trudy; Blue, Ilona; Goldstein, Greg **(1998). Healthy city projects in developing countries: an international approach to local problems. 148 p. ISBN 1_85383_455_6 (pbk). GBP 15.95**

Supplier: Earthscan Publications, 120 Pentonville Road, London N1 9JN, UK

health and environment city ecology

health care; primary health care; project development; urban development; health; urban management; urban policies; urban poor; pollution; poverty

Analyses the current state of Healthy City Projects in developing countries. This approach has been implemented by the World Health Organization (WHO) in the wake of the Ottawa Charter (1985) in which a holistic approach to public health care was developed based on the idea that living and environmental conditions are responsible for health. This is particularly acute in cities where so many people live and work together in close proximity. Originally established in 11 European cities, then spreading throughout Europe and then also in other regions of the world, the project is now active in at least 1,000 cities or towns. Core concepts in the Healthy City programme are: (1) Better health will come, not so much from curative care but from improved living conditions; (2) People must take the initiative to improve their own health and their own environments; (3) Health should be seen as an essential part of overall development within the community. A Healthy City project supports city health authorities and/or local government in the field of information and analysis, in particular monitoring of health status and analysis of requirements. In addition, support in policy and advocacy is of paramount importance, developing policies for individual sectors.

This book draws on a range of examples to illustrate how to design, implement and evaluate the integration of public health into urban management. It provides descriptions of the different project phases. Noteworthy is a list of interesting indicators for evaluation. A number of case studies is presented. There is much

attention to rapid appraisal techniques and to priority setting procedures. Community participation is highlighted as crucial. The book ends with an examination of factors influencing the transformation of a project cycle into a continuous process. Illustrations are scarce, but there are many boxes with the case studies. Rather for specialists than for a wide audience. (WB)

WHO Scientific Group **(1989). Health guidelines for the use of waste water in agriculture and aquaculture. World Health Organisation Technical reports series no. 776. WHO Scientific Group, World Health Organisation (WHO), Geneva, Switzerland**

wastewater reuse health and environment

wastewater management; wastewater reuse; aquaculture

Provides a comprehensive overview of health in relation to wastewater use in agriculture. The publication starts by covering the major aspects and current practices on reuse of waste water including: wastewater as a resource, environmental control issues, chemical pollutants, economic aspects, institutional aspects and sociocultural issues. The following chapters deal more specifically with health aspects: infections caused by pathogens; factors involved in disease transmission; epidemiological evidence; health promotion and planning; and implementing safeguards. Lastly the need for further research is discussed. (NB)

Winblad, Uno **(1997). Towards an ecological approach to sanitation. Publications on Water Resources no. 5. 13 p. Department for Natural Resources and the Environment, Swedish International Development Authority (SIDA), Birger Jarlsgatan 61, S-10525 Stockholm, Sweden**

waste recycling health and environment

waste management; sanitation; wastewater

Waste management and reuse is an important element in urban agriculture. This paper presents an ecological approach to sanitation and challenges the flush and discharge systems as these create problems with sewage disposal, water scarcity, ecosystem overload and waste water treatment. Central in the approach is how to achieve safe, non polluting sanitation for all habitants in the rapid growing cities, short of money, water and institutional capabilities. Principles (keep wastes separate, dehydrate, don't flush and don't waste fertiliser) plus practical examples are presented. (NB)

World Bank**? (199?). Urban agriculture: the big, unknown, polluting, and mobile compliment to rural agriculture, so very important for the urban poor. Agriculture technology notes. 4 p. World Bank?**

food security and nutrition health and environment

urban agriculture typology

A general overview of types of urban agriculture. Figures given and descriptions in

the typology of urban agriculture are useful. (WB)

World Health Organization (WHO), European Centre for Environment and Health **(1995). Contamination of food and drink. In: Concern for Europe's tomorrow: health and the environment in the WHO European region, p. 241-273. World Health Organisation (WHO), European Centre for Environment and Health**
health and environment
food contamination; pollution; health hazards; public health

Provides an overview of factors liable to contaminate food and lists food safety regulations, services and information systems in the European context. (WB)

World Health Organization (WHO) **(1995). Highlights of recent activities in the context of the world declaration and plan of action for nutrition. WHO/NUT/95.2. Nutrition Programme, World Health Organization, Geneva**
food security and nutrition health and environment
food security; political aspects

Contains a short description of the World Declaration and Plan of Action for Nutrition, the outcome of the International Conference on Nutrition (ICN) organised by FAO and WHO in 1992. The nine decade goals and nine action-oriented strategies of the World Declaration and Plan of Action for Nutrition are summarised in this document. (WB)

World Health Organization (WHO) **(1998). Book of abstracts: international healthy cities conference, Athens (Greece), 20-23 June 1998. 172 p. World Health Organisation (WHO) Regional Office for Europe, Scherfigsvej 8, 2100 Copenhagen, Denmark; Municipality of Athens**
health and environment
development projects; public health; Healthy Cities programme; case studies

Contains 175 short descriptions of projects carried out or monitored in the framework of the Healthy Cities movement. Sixty-three cities are reviewed, out of which 41 European and 22 non-European. An index provides access to the abstracts per country and city, but there is no subject index, unfortunately. Looking for specific subjects is, for that reason, difficult. Each abstract carries a name and address, but it is unclear if this belongs to the person responsible for that project, or the abstracter, or both. (WB)

World Health Organization (WHO) **1999. Contaminated soil in gardens: how to avoid harmful effects. Programme for Nutrition Policy, Infant Feeding and Food Security, World Health Organisation (WHO), Regional Office for Europe, Scherfigsvej 8, 2100 Copenhagen, Denmark**

health and environment
soil remediation; health; home gardening; soil contamination

Provides practical precautions to avoid potential negative or harmful impacts of contaminated soils in gardens. Normal garbage in landfills does not present a problem but industrial and chemical waste potentially present health hazards. Issues like what to do when soil is contaminated, how to reduce risks, the best way to garden and more are discussed. (NB)