

## **P.R.China: Ecological sanitation in Beijing's Olympic Forest Park**

The Olympic Forest Park (700ha) in Beijing is expected to receive over 5 million visitors per year. Size, distinguished landscape design and a source separation based sanitation system make the park unique. The idea to establish an alternative sanitary solution in the park was born from economical considerations, when the high building- and maintenance-costs of conventional solutions were estimated. Primary aims of the reuse-oriented sanitation systems applied were to reduce the overall mass flow and to guarantee environmentally sound and hygienically safe management of the collected materials.

The applied technologies range from Urine-Diverting-Dehydration-Toilets, over separating to non-separating flush systems. Urine is harnessed as yellow-water (diluted with some flush and hand wash water) and treated by storage in a facility of 2.000m<sup>3</sup> capacity. Faeces are to the greatest part diluted with flush water and collected as brown water. A smaller proportion is gathered in dry toilet units as faecal matter. Brown-water is treated decentral at each sanitary unit in settling tanks and biological reactors. Brown-water sludge and faecal matter are co-composted with grass clippings and shredded vegetation. The effluent from the biological reactors passes an open infiltration drain system. The nutrients (20t N, 3t P, 9t K) contained in the estimated annual 4.400m<sup>3</sup> of yellow-water and 1.400t of compost are to be recycled back into productive ecosystems.

The development of an elaborate product use strategy is currently supported by gtz-ecosan. While in rural areas with nutrient deficient soils recycling of nutrients from sanitary wastes is comparatively simple, it requires careful consideration in urban areas where population pressure is high and available land limited. The amount of ecosanitary products that can be recycled within the park is limited by it's inherent sink (defined by area, uptake into biomass and soil fixation etc.) and by additional external inputs (e.g. via deposition and irrigation water). The provisional strategy foresees that yellow-water is used for the fertigation of park and that potential over fertilisation is avoided by export of excess nutrients. For green areas in proximity to the Olympic Forest Park yellow-water is a convenient nutrient source, while for areas in greater distance compost is favourable due to the higher nutrient concentration. A complex mass and nutrient flow model that has been developed and will indicate optimal flow volumes as soon as operation data become available.

Beyond the expected economical advantage as a sum of construction and maintenance (water, energy and disposal) savings plus the nutrient value, major benefits are the reduced nutrient pollution in natural water bodies (via conventional waste water treatment plants) and the educational value.