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Biological Monitoring: Vegetation Cover, Bird Assemblages, Rodents, Terrestrial and Aquatic Invertebrates from a Closed Landfill

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Abstract : Three currently active landfills receive the waste from Buenos Aires city and the Great Buenos Aires suburbs. One of the first landfills to receive solid waste from this area was located in Villa Dominico, some 7 km south from Buenos Aires City. With an area of some 750 ha, including riparian habitats, divided into 14 cells, it received solid wastes from June 1979 through February 2004. In December 2010, a biological monitoring program was set up by CEAMSE and Universidad Nacional de Lujan, still operational to date. The aim of the monitoring program is to assess the state of several biological groups within the landfill and to follow their dynamics overtime in order to identify if any, early signs of damage the landfill activities might have over the biota present. Bird and rodent populations, aquatic and terrestrial invertebrates' populations, cells vegetation coverage, and surrounding areas vegetation coverage and main composition are followed by quarterly samplings. Bird species richness and abundance were estimated by observation over walk transects on each environment. A total of 74 different species of birds were identified. Species richness and diversity were high for both riparian surrounding areas and within the landfill. Several grassland -typical of the 'Pampa'- bird species were found within the landfill, as well as some migratory and endangered bird species. Sherman and Tomahawk traps are set overnight for small mammal sampling. Rodent populations are just above detection limits, and the few specimens captured belong mainly to species common to rural areas, instead of city-dwelling species. The two marsupial species present in the region were captured on occasions. Aquatic macroinvertebrates were sampled on a watercourse upstream and downstream the outlet of the landfill's wastewater treatment plant and are used to follow water quality using biological indices. Water quality ranged between weak and severe pollution; benthic invertebrates sampled before and after the landfill, show no significant differences in water quality using the IBMWP index. Insect biota from yellow sticky cards and pitfall traps showed over 90 different morphospecies, with Shannon diversity index running from 1.9 to 3.9, strongly affected by the season. An easy-to-perform non-expert demandant method was used to assess vegetation coverage. Two scales of determination are utilized: field observation (1 m resolution), and Google Earth images (that allow for a better than 5 m resolution). Over the eight year period of the study, vegetation coverage over the landfill cells run from a low 83% to 100% on different cells, with an average between 95 to 99% for the entire landfill depending on seasonality. Surrounding area vegetation showed almost 100% coverage during the entire period, with an average density from 2 to 6 species per sq meter and no signs of leachate damaged vegetation.

Keywords : biological indicators, biota monitoring, landfill species diversity, waste management
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