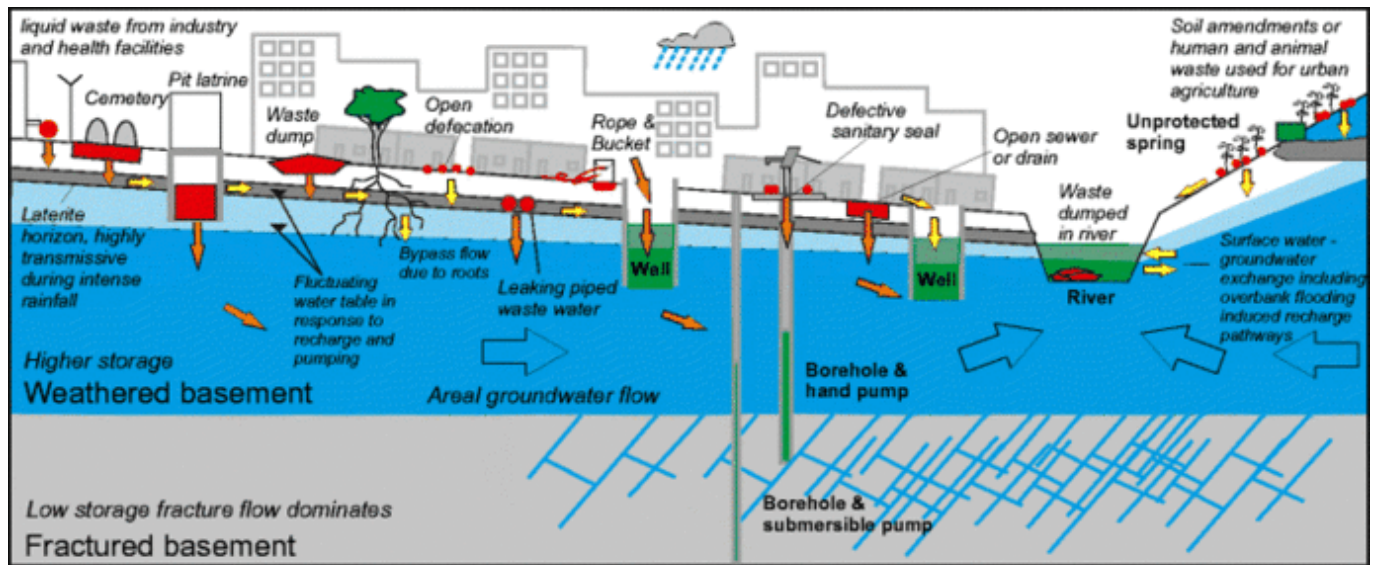


# File:UrbanGWRisk.gif

From Earthwise

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**Sources of contamination** providing an essentially diffuse input of hazards to the surface, e.g. open defecation by humans as well as animals, surface liquid discharge from household and municipal waste water, as well as sources that are buried in the subsurface, e.g. waste dumps, historical mining waste, pit latrines, septic tanks and cemeteries.

**Receptors of hazards** including the groundwater resource as a whole as well as specific groundwater supplies including wells, boreholes and springs. Surface water is also a receptor of hazards. Shallow wells and springs are at risk from septic tanks and shallow waste systems and in low lying areas where shallow water tables persist and which are prone to flooding during high intensity rainfall events.

**Transient pathways for hazard** to migrate to the subsurface linked to intense rainfall events. High risk from rapid lateral transport in/above laterite horizon when infiltration capacity of soil is exceeded. Limited vertical transfer beyond laterite horizon particularly during the early part of the rainy season when there are low moisture levels in the shallow subsurface below the laterite horizon and the water table is deeper.

As the rainy season progresses soil moisture and areal recharge increase and trigger pathways for surface-subsurface migration of hazards. The intensity of the rainfall is an important factor and may lead to transient surface runoff, ponding and lateral flow above and in the regolith and laterite horizon, i.e. pipe-flow when vertical infiltration is exceeded. The first flush of contaminants during early rains can lead to a large pulse of contaminants from the surface to the subsurface due to focussed urban recharge processes.

**Continuous pathway for hazard** to migrate to depth within groundwater via i) continuous source of recharge of liquid waste such as soak-aways, open sewers or surface discharge providing continuous pathway to the water table or, ii) where there is direct bypass of the soil and unsaturated zone i.e. using a bucket and rope or cracks in well or borehole seal. This may be a particular issue at the end of the dry season / start of the wet season, due to intense use of fewer non-seasonal sources.

**Areal groundwater flow** from piezometric high points towards natural discharge points, such as rivers. There may also be discharge from springs; flow from these sources will be linked to cumulative rainfall, rainfall intensity (especially in rapidly responding or transient springs), aquifer storage and recharge processes.

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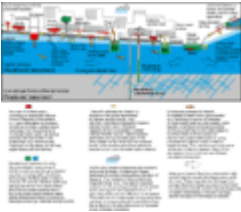
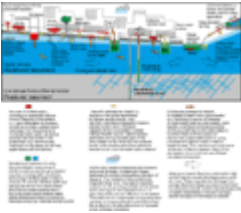


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