

**UNEP**

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**OUAGADOUGOU  
HYDROLOGY/  
LABORATORY**

**URBAN POLLUTION OF SURFICIAL AND GROUNDWATER  
ACQUIFERS**

**VULNERABILITY IN WESTERN AFRICA**

**AQUIFERE SUPERFICIEL ET POLLUTION URBAINE  
EN AFRIQUE DE L'OUEST**

**QUALITY OF OUAGADOUGOU DRINKING  
WATERS**

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## INTRODUCTION

The “URBAN POLLUTION OF SURFICIAL AND GROUNDWATER AQUIFERS IN AFRICA” project is a joint UNEP/UNESCO initiative of monitoring of surficial and groundwater's in African cities. It is aimed at identifying the eventual pollution hot points and raising the populations and decision makers' awareness on these issue.

Ouagadougou has been selected as a project site during the experimental phase whose activities entrusted to the Hydrogeology laboratory of the University of Ouagadougou were launched in January 2000. The first publication of the Early Warning bulletin contains the first achievements of the national project's team. The bulletin will be regularly released and shall be the regular warning journal entitled to disseminate the information on the quality of the drinking water in Ouagadougou.

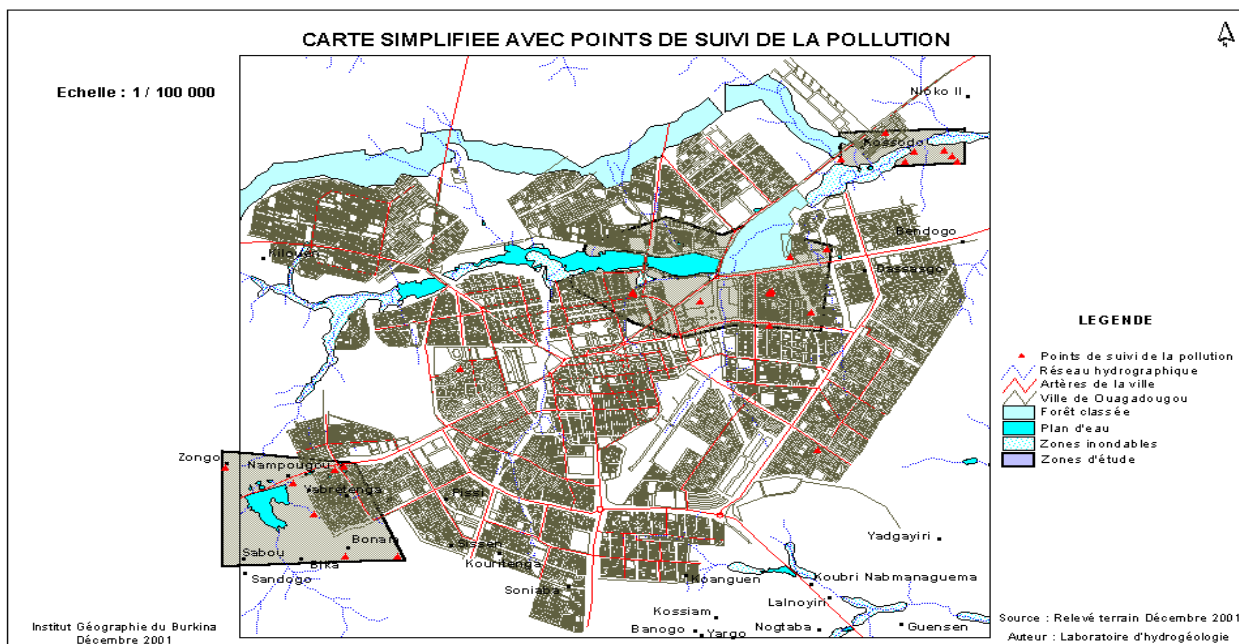
The Authorities of the University of Ouagadougou thought it necessary to have the collaboration and cooperation of the population to achieve this project which involves the health of the residents of the City.

### I Follow-up Guidelines

The hydrology laboratory has targeted three test areas for the follow-up of the urban pollution in Ouagadougou (see map showing pollution monitoring stations).

- **An input area** corresponding to the upstream zone of the Boulmiougou dams whose water supplies the dames 1,2 and 3 connected to the urban supply system of drinking water.
- **An intermediary area** in the city centre located in the surrounding of the dam 3 and encompassing the sector where outflows the main channel draining the rain-waters and waste-waters of the city.
- **A third area** corresponding to the industrial area of Kossodo with its waters which, far away in the downstream zone, will join the water from the intermediary area after crossing the reserved forest.

Out of the three areas, 25 water points including wells and bore-holes have been selected for chemical monitoring.



## II RESULTS ANALYSIS

Out of the 25 water points under monitoring, the following data results from two water points (one well and one borehole) per area were obtained.

The first input data selected were a rainfall graph and the chemical analysis of the water points.

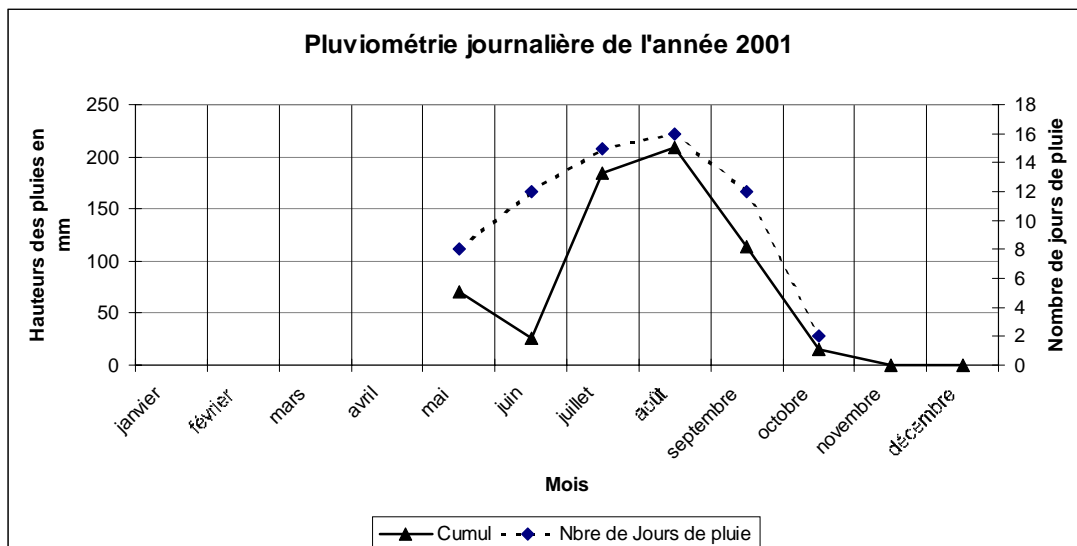
The rainy season starts in May and ends in October. During the same period, the nitrate contents significantly increase in the underground waters, mainly the underground waters tapped by wells, reaching their highest level in August.

The nitrate contents usually remain under the portal water threshold. But the highest concentrations were recorded in the wells. The water of the Boulmiougou well contained excessive nitrate contents. The leaching of the inputs used for the market gardening generates the nitrates. Elsewhere, the high nitrate concentrations were registered only in the water of the borehole of the Industrial Are. These nitrates are generated by the percolation of the Industrial wastes permanently containing concentrations always superior to 40 mg/l.

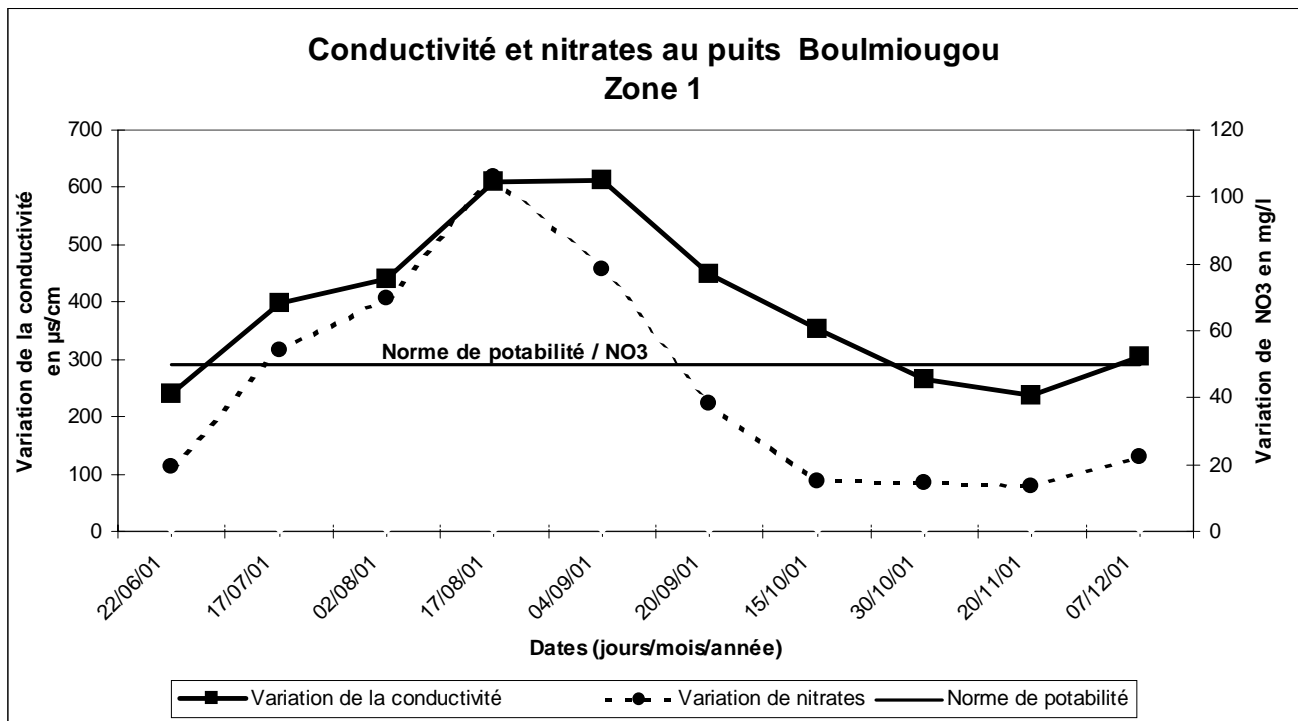
Table 1: Rainfall for 2001

Month	Rainfall in mm	Number of Rainy days
January		
February		
March		
April		
May	70,6	8
June	26,3	12
July	183,9	15
August	208,4	16
September	114,4	12
October	14,7	2
November	0	
December	0	

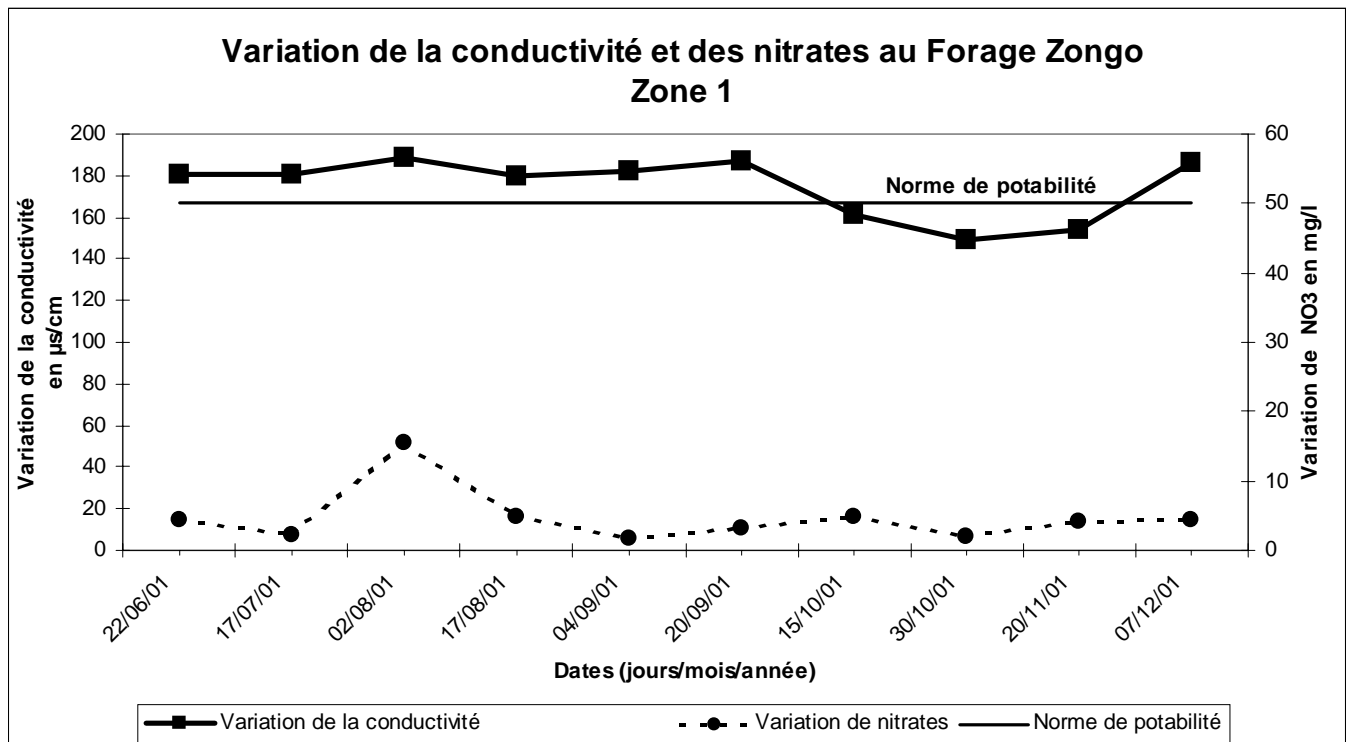
Daily Rainfall for 2001



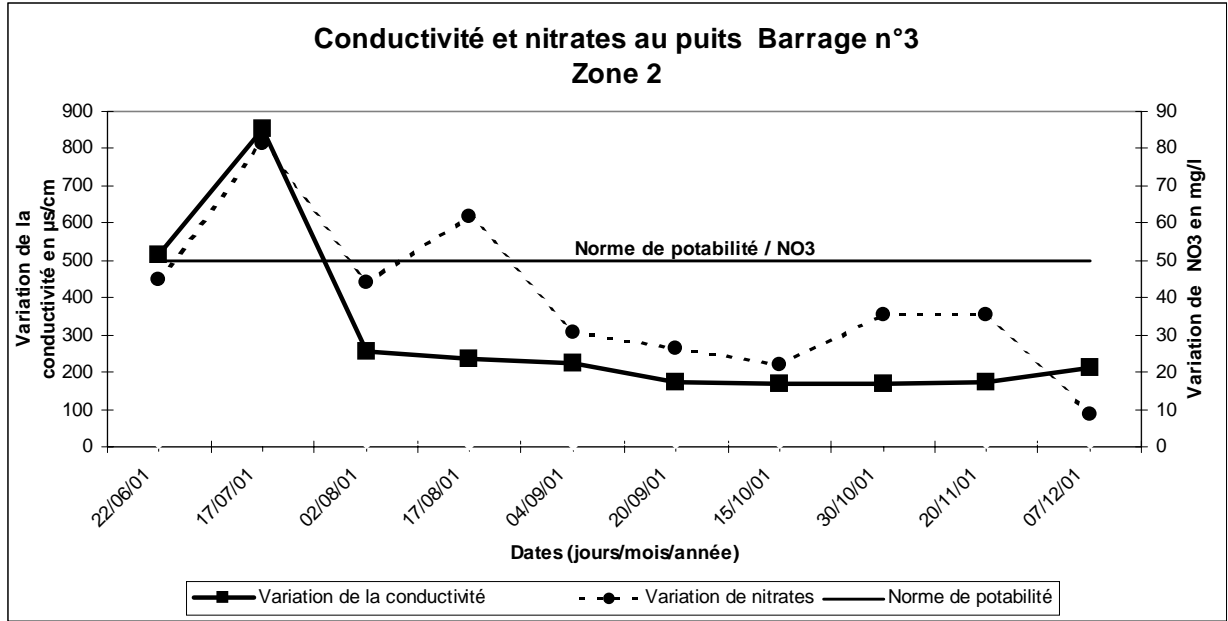
The variation in the conductivity and NO<sup>3</sup> concentrations recorded in the wells and bore-holes of sector I



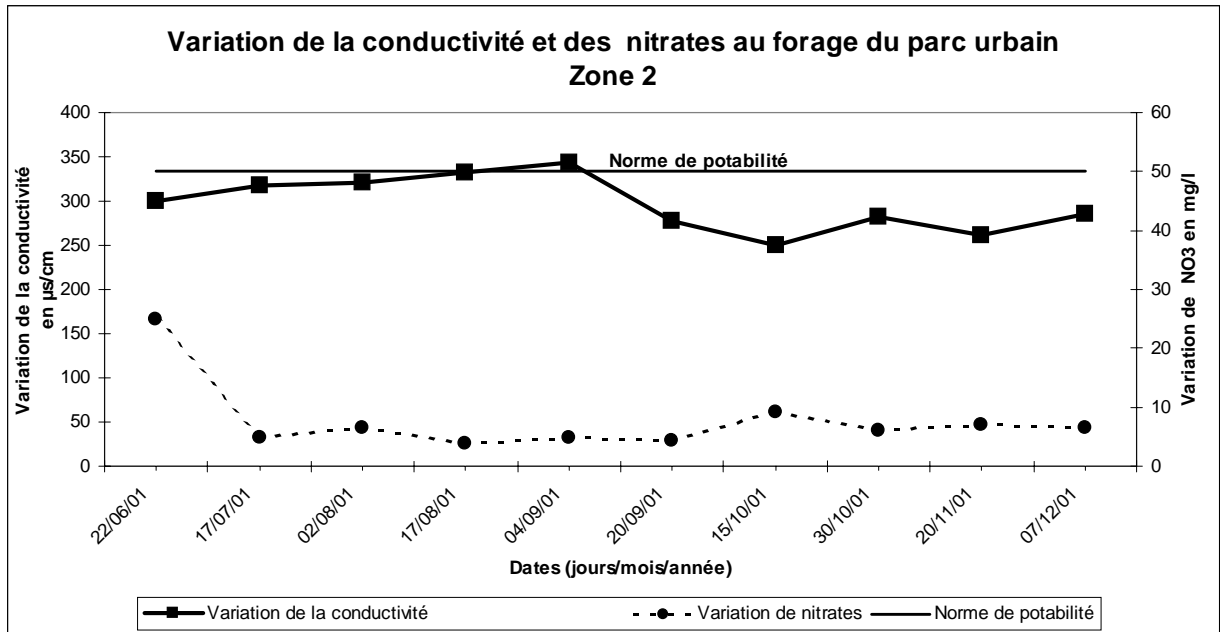
Variations in the conductivity of the nitrates recorded in Zongo bore-hole in sector I



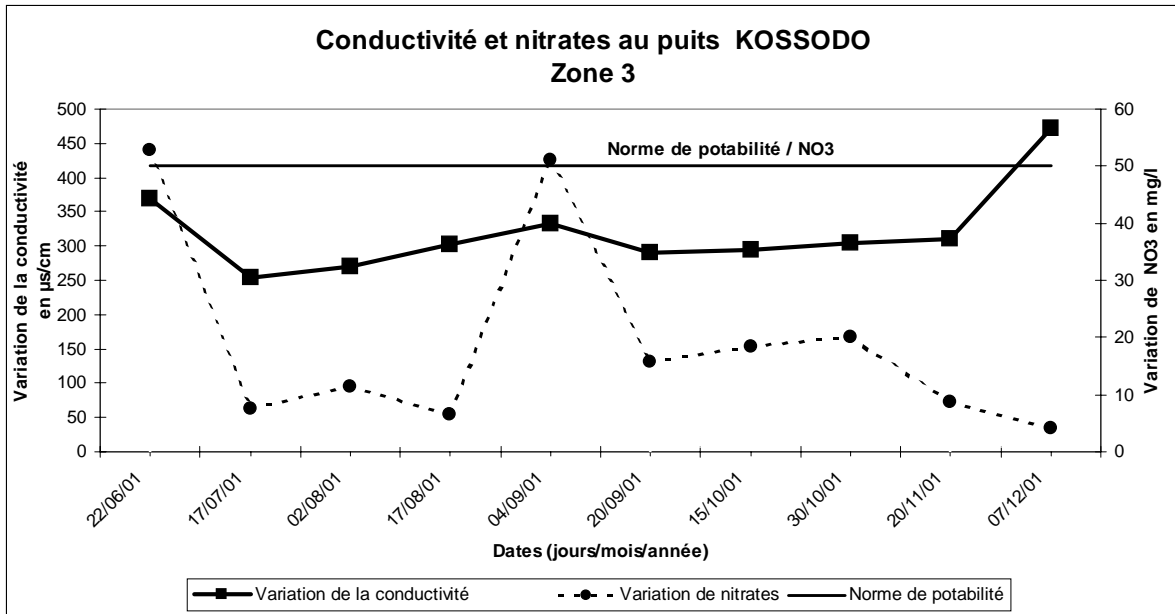
**Variation of the conductivity and NO<sup>3</sup> contents recorded in the wells and bore-hole of the sector II**



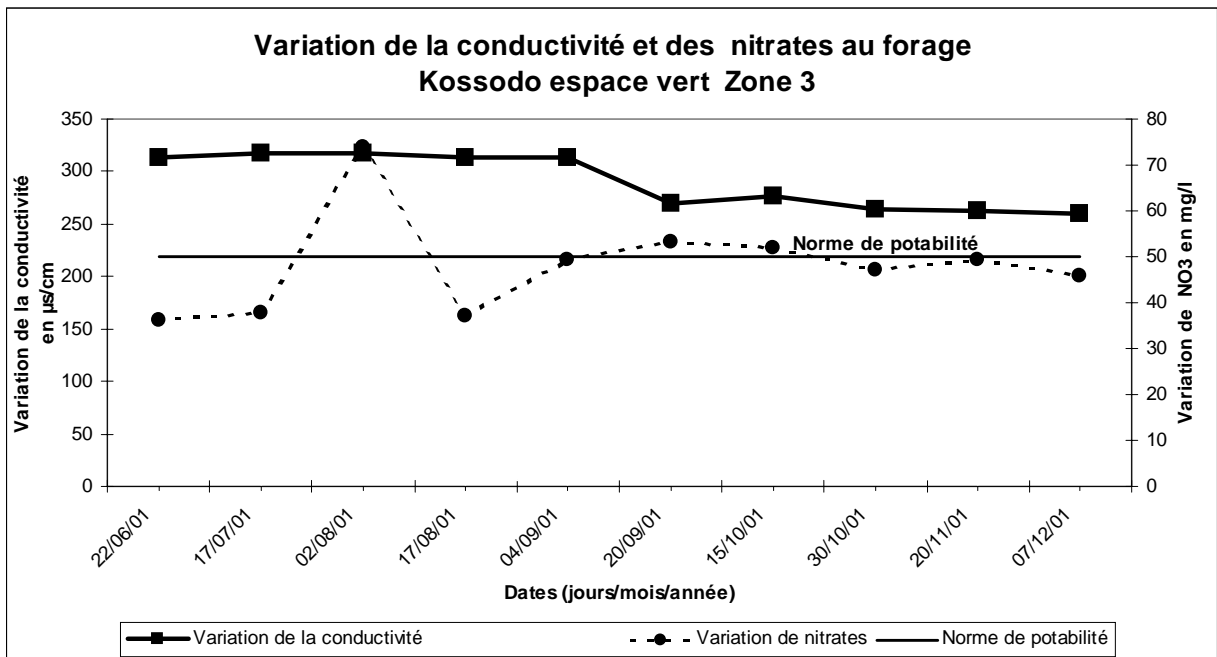
**Variation of the conductivity and Nitrate concentrations recorded in the bore-hole of the city-Park (Sector II)**



**Variation in the conductivity of the NO<sup>3</sup> concentrations recorded in the wells and bore hole of the sector 3.**



**Variation in conductivity and nitrate concentrations recorded in the bore-hole of Kossodo (Park - Sector 3)**



### III CONCLUSION

- The most superficial waters tapped by wells are the most polluted ones in the city. Pollutants drained by the first percolating waters achieve their maximum concentration in August. Then they are diluted by the rain waters of September and October;
- The evaporation results in a low increase of nitrate contents in the water;
- The bore-hole tapping the aquifers of the fractured fringe of the substratum are not very polluted.

The wastes from the sewer of the main channel of the city and from the factories of the industrial area of Ouagadougou are the pollutant hot points to the city aquifers.

The peri-urban farming activities are also a source of pollution mainly to ground waters.

The water conductivity fluctuates along with the nitrate concentration. The ground waters are unfit for human consumption. They should be reserved for washing, farming and cattle watering.