

fertilization of the ovum would allow farmers to raise animals of the desired sex based on their breeding needs and market demands. This paper reviews current sperm sexing technologies such as flow cytometry or cell sorting, H-Y antigen detection, and detection of sex-specific proteins on the sperm surface as well as embryo sexing technologies such as chromosome analysis, polymerase chain reaction and other methods. Moreover, it discusses how sexing technologies can further enhance other reproductive technologies namely artificial insemination, embryo transfer, in vitro fertilization, embryo splitting and cryopreservation, and the potential applications of these technologies in animal production.

Keywords: DNA, embryo, flow-cytometry, sex chromosomes, sperm

CHEMICAL, MATHEMATICAL AND PHYSICAL SCIENCES

DEMOGRAPHICS AND EDUCATION

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From data obtained during the work on Division Elementary Development Plans (DEDP) for the 20 poorest provinces in the Third Elementary Education Project (TEEP) and from more recent data of the Department of Education, we would like to explore the challenges posed by demographics on providing elementary education to all Filipino children. The data show us:

1. The pressure on number of teachers, classrooms and budget
2. High dropout rates in the poorest provinces (about 20% in the first two grades)
3. Health problems especially lack of water and toilets}
4. Problems of distribution
5. Diversity of the system

For example, too many students and not enough classrooms in urban areas

and, on the other hand, classrooms without students in some rural areas because there are not enough students to meet minimum requirements.

Some conclusions are that the size, diversity and complexity of the problems do not allow for centralized solutions. It is important to seek solutions on the division or district level.

Keywords: demographics, elementary education, diversity, DEDP, TEEP

WATER SUPPLY IN THE PHILIPPINES: CEBU AS OBJECT OF A CASE STUDY

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This paper intends to show that the understanding of nature's water supply system is essential for a sound management of a water distribution system. The focus of the paper is Cebu City with its direct surrounding, because it is a contained supply and consumption system that has some historical data.

From 1911 until World War II Cebu relied on surface water (Buhisan dam) and groundwater (Jagobiao spring) for its distribution system. When the cleanup of the war damage reached Cebu, deep wells were added to the system. The inspiration of the Buhisan dam produced two feasibility studies with plans for two high dams. The growing demand has been followed by a further exploitation of ground water resources by government and private entities. The progressive sea water intrusion proves that the narrow coastal aquifer is under stress.

Over-extraction of ground water from the coastal aquifer does not really lower the water table, because the sea resupplies without limits. The problem is that 1% seawater mixed with 99% fresh water establishes 250 ppm Cl⁻, which is the upper limit acceptable according to WHO guidelines. Two percent seawater produces 500 ppm Cl⁻, a concentration which the local population does not accept. The sad irony is that Cebu talks about sufficient surface water in its own backyard while it acts to permanently destroy the ground water source that can supply one third of its needs.