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Groundwater management in Cusco region, Peru Present and future challenges

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The agriculture in the rural areas in the Andes Mountains at Cusco region-Peru is mainly rain fed agriculture and basically concentrated to one crop season per year. This situation limits the farmer's development. In order to increase the agricultural season into the winter period (May to November) also known as the dry season, many farmers are pumping water from streams or underground water that unfortunately leads to many of them becoming dry during the winter/dry season. In addition, some of those streams are polluted by the city's wastewater and heavy metals that are released from mines which are quite abundant in the Andes Mountains.
The regional government through its engineering organization "Per Plan Meriss Inka", is trying to increase the water quantity and quality to the end users (farmers in the valleys) by promoting projects that among others include capturing of springs that emerge from the high mountain ridges, diverting streams and harvesting surface reservoirs.
In the Ancahuasi area (Northwest of Cusco) are many springs that emerge along several geological faults that act as a border line between the permeable layers (mostly sandstone) in the upper throw of the fault and impermeable layers in the lower throw of the fault. The discharge of the springs varies in dependence to the size of each catchment area or aquifer structure.
The spring water is collected in small pools and then by gravity through open channels to the farmers in the valleys. During the past 25 years, in some places, springs have been captured by horizontal wells (gallery) that were excavated from the fault zone into the mountain a few tens of meters below the spring outlet. The gallery drains excess water from the spring storage and increases the overall discharge. The galleries are a limited solution to individual places where the geology, hydrology and the topography enable it.
The farmers are using flood irrigation systems which according to World Bank documents, the overall efficiency of such irrigation systems is about 35% (most of the water recharges to the underground or is lost by evaporation). Slightly increasing the efficiency by only 10–20% together with bringing additional water would cause a dramatic change in the farmer's life and in their income.
A Pre-feasibility study indicates that there are deeper subsurface groundwater systems that flow from the Andes Mountain downstream to the valleys. The deeper systems are most probably separated from the spring systems. The deeper groundwater systems are flowing from the Andes Mountains downstream via individual paths, in places where both sides of the faults contain permeable layers and through several alluvial fans. Detailed researches are planned in the next few years to identify those individual sites and to locate sites for drilling boreholes (observation and production).
Today, an integrated water resources management at the local and regional level is lacking. The feasibility studies will include recommendations to the regional government on how to implement such an integrated management program together with capacity building of the institutional capability of regional governments.