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Title : The Initial estimation of saved water quantity and executive costs of proposed projects of the agricultural demand management sector for catchment of Kashaf Rud

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Abstract:

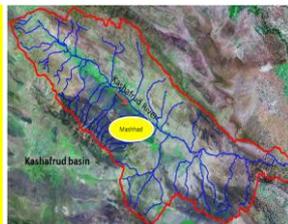
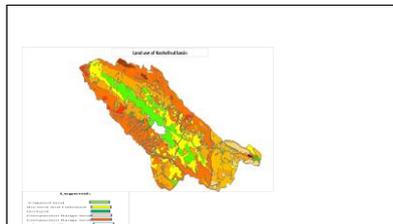
Kashafrud basin is including region that, the population growth and scarcity of water resources existing within the boundaries of this region, has doubled up the especial consideration to be given to water management of this region. On the other hand, most of the surface water resources of the basin are controlled or being used. In regard with groundwater resources, due to irrational extraction and over drafting of the plains aquifers, and according to water budget data in 2006, most aquifers and water tables have dropped down, so that sum of the plains of this basin faced with a deficit of around 160 MCM in their aquifer reservoirs. These studies that were performed in 2006-2007 within Kashafrud basin indicate that by application of water demand management schemes in agricultural sector in the basin area, such as pressure irrigation, modifying of cropping pattern, development of greenhouse cultivations, and proper reuse of municipal treatment plant sewage effluents, the current situation can be improved and also balance between water consumption and existing recourses can possibly be achieved in future conditions.

Key words:

Kashafrud catchment basin, wastewater reuse, water quality, agriculture.

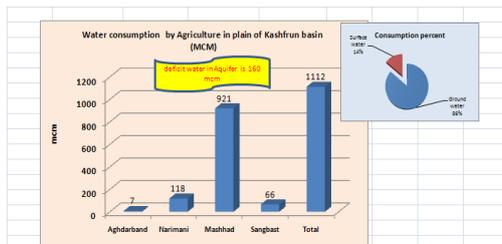
contents:

Kashafrud basin is located northeast of Iran between 58°,18' to 61°,13' E longitude and 35°,38' to 37°,04' N latitude. The 16750 km² Kashafrud is regarded as the most important basin in Khorasan province, encompassing the Mashhad, Chenaran, Narimani, Sangbast and Aghdarband plains. (نقشه ایران)

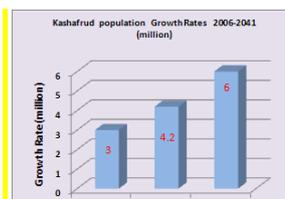


The agricultural sector is the main water consuming sector of all and according to the result of studies, about 80% of total water consumption is allocated to this sector.. Considering that about 130,000 hectares of lands are under cultivation, only about 10% of it are under pressure irrigation

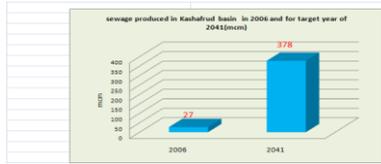
Kashafrud River is the main drain in this basin. Around 1100 MCM of water is being used for agricultural purposes in this basin, out of which 956 MCM is supplied through groundwater, and 156 MCM through surface water.



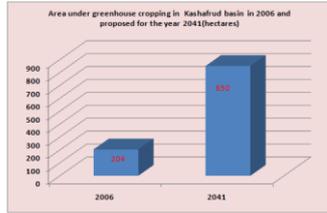
The population of 3 million in 2006 is estimated to grow up to 6 million in 2041 and proportional to this population growth, municipal and industrial water demands shall rise up from 200 MCM in 2006, to something around 600 MCM in 2041 (عكس از رشد جمعیت)



Presently, around 27 MCM annual effluents is produced in wastewater treatment plants. It is estimated that the effluent volume may reach 372 MCM annually in 2041, out of which 95% will be from the study area between Mashhad and Chenaran.



Greenhouse cultivation is one of the main approaches to be taken for increasing the benefit to cost ratio of water resources utilization in arid and semi-arid regions. Presently, about 200 hectares of farmlands are allocated to greenhouse and recommendations is to reach about 850.



One of the demand management approaches in agriculture sector is modification of cultivation pattern. Suitable cropping pattern for this basin was selected by considering climate, soil, water quality, local choice, economic viability, etc., using Lingo software. The highest income per unit volume of water consumption was from saffron amongst the existing agricultural products. Another product cultivated in recent years is pistachio nuts. Considering the arid and cold climate of the region, priority shall be given to those crops that are heat and sunshine tolerant, and resistant to aridity, such as "sorghum" or crops with high water use efficiencies like corn (due to circulation C4). Therefore increasing land allocation to corn and sorghum is recommended. Also to take the advantage of rainfall and river flow, cultivation of autumn cereals is to be taken into account.

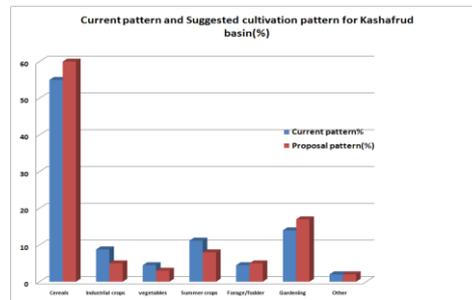
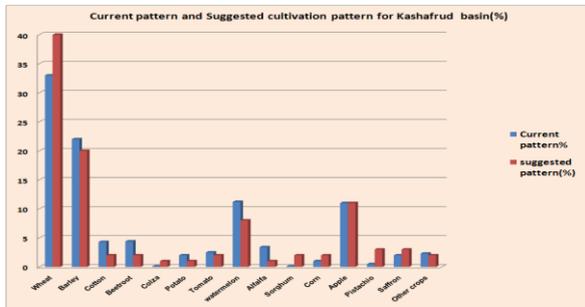


table and graph:



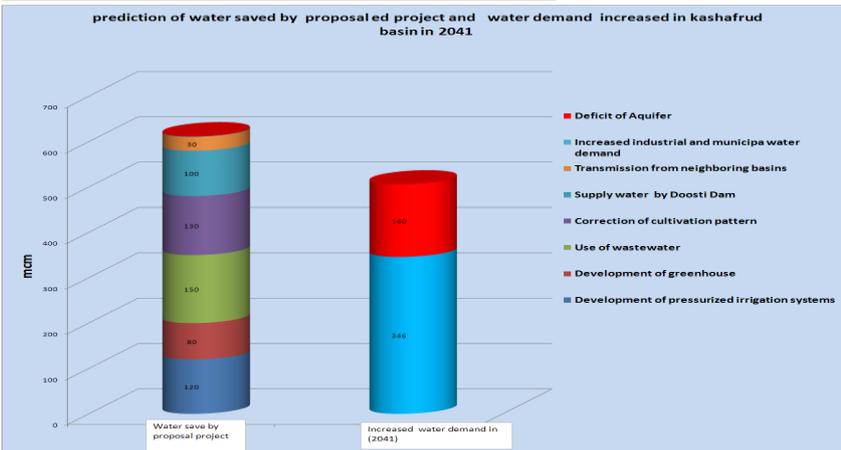
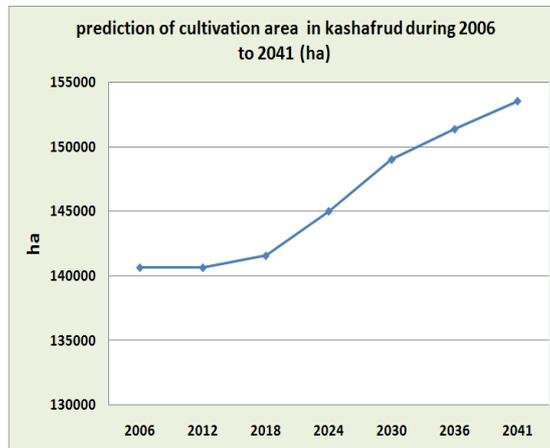
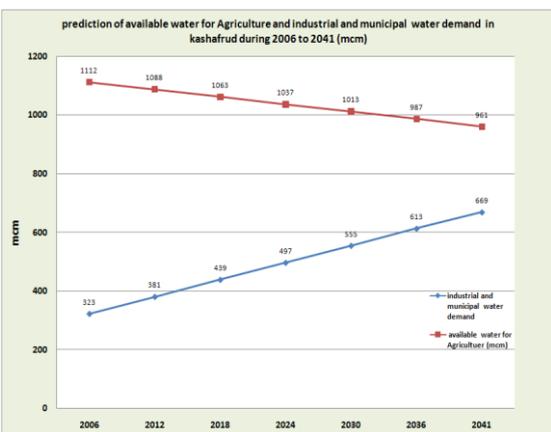
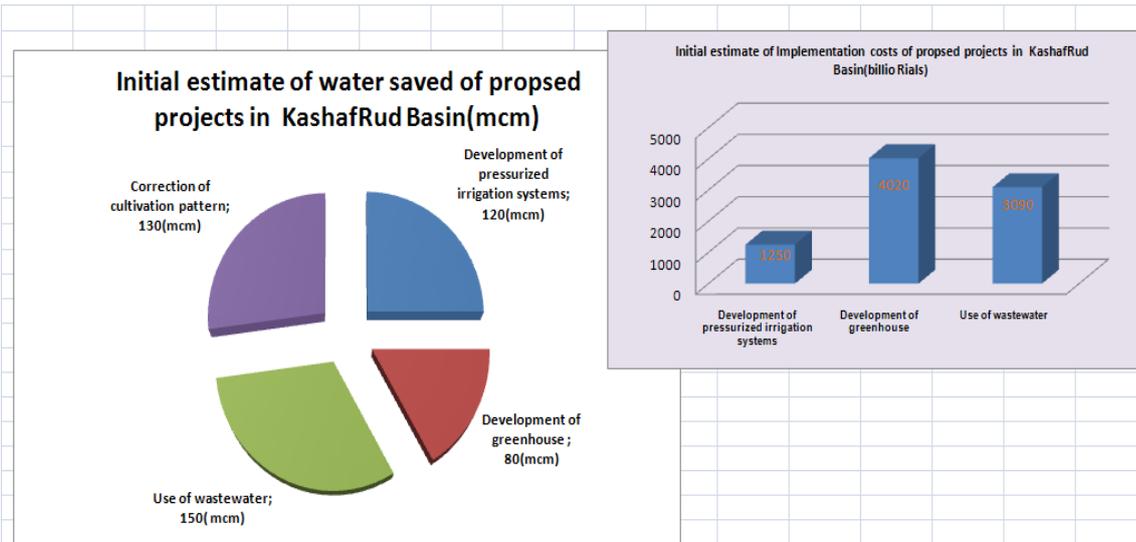
Development hydroponics greenhouse



centerpivot Irrigation

Conclusion:

Considering the above mentioned issues, summarized results in regard with amount of possible water conservation and initial costs of execution of recommended plans, each of the demand management approaches in agricultural sector in KashafRud catchment basin are as displayed in graph. Achievement of any of the objectives mentioned for demand management will require at least a time period of 30 years (target year of 2041).



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