

JERSEY GROUNDWATER

ASSESSMENT OF BRITISH GEOLOGICAL SURVEY REPORTS

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INTRODUCTION

This note presents a brief assessment of the two reports:

Hydrogeological and hydrogeochemical survey of Jersey: EGS, 1991
Jersey Groundwater - Year 2: EGS, 1992

Copies of these reports were provided by Mr G Baudins and the work was carried out during the period May 7-14, 1993.

The reports present the results of a hydrogeological survey of Jersey carried out during 1990/91 and 92 and of groundwater modelling carried out in 1991. The basic conclusion of the reports is that the level of groundwater abstraction (estimated at 3.7 million cubic metres per year) is sufficiently close to the estimated amount of natural recharge (5.5 MCM per year), that there is a serious risk if long term depletion of groundwater reserves. Additionally it is concluded that nitrate and potassium levels in groundwater sources indicate a potential problem with groundwater quality.

ASSESSMENT

The principal conclusion of the reports and the results of the modelling presented are totally dependent on the accuracy of the groundwater recharge estimates. This estimate is derived from conventional hydrological calculation based on both meteorological records and on soil moisture deficit calculations. Both of which the authors recognise to contain significant approximations. It would perhaps be of interest to enquire as to why estimated annual infiltration for Jersey is so much less than that quoted for the three comparable islands in Table 9 of the 1991 report. In spite of the uncertainty of the recharge estimate it is used as sole basis for the statement that 'the groundwater resources of the island are being overpumped and are not wholly replenished in a normal recharge year' (1991 Report, p77). This conclusion is unsupported by either chemical evidence or by the limited water level data presented.

While the recharge estimates provided are recognised as being approximations this approximation is insignificant when compared with an extremely basic omission from the calculation. The Island of Jersey is a developed community and the vast majority of the population receive piped water supply. For Jersey the figures presented in the introduction to the 1991 Report suggest that 80% of the population receive piped water from public supply, 96% of which is derived from surface sources. This would suggest that surface water supplies a volume three to four times greater than groundwater (12-15 MCM per year). In any piped water system leakage is likely to be of the order of 20% (cf Twort, Hoather and Law, 1974) the bulk of which will return to the groundwater reservoir. This suggests that for Jersey a recharge estimate based solely on natural recharge underestimates the volume of recharge by 2-3 MCM per year. Other significant contributions to groundwater recharge are likely to be derived from large surface storage reservoirs and from soakaway type sanitation.

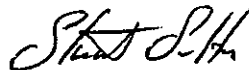
It is therefore suggested that the principal conclusion of the EGS Reports is derived from an initially erroneous estimation of recharge volumes and that, in terms of volume, the groundwater resources of the Island of Jersey are not under stress.

The chemical evidence presented in the reports does not provide any indication of overexploitation or of developing saline intrusion. It does however provide cause for concern in view of the consistently high levels of nitrate and potassium reported. This indicates increasing contamination from human activity which in turn serves to underline the gravity of the omission of anthropogenic sources from the recharge calculations presented.

For a groundwater regime as complex as that of the fissured rock aquifers of Jersey the task of construction of a representative groundwater model is one of immense complexity and can certainly not be achieved by the use of a porous medium model such as MODFLOW. The model results presented are of dubious reliability and are totally dependent on the accuracy of the input parameters none of which are well defined and one of which (recharge) I would contend is seriously in error.

CONCLUSION

The principal conclusion of the EGS Reports that the groundwater resources of Jersey are at serious risk of substantial depletion is based on an erroneous estimation of recharge volumes and is untenable. There is however, a serious risk of declining water quality arising from human activity.



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