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Water-stressed population over Asian monsoon region estimated by world water resources under SRES scenarios

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Global and regional populations lived in highly water-stressed basin for a function of the temperature were estimated using the socio-economical data and the outputs of GCMs. In global, the highly water-stressed population in scenario A2 rapidly increased when the anomaly of temperature is exceeding to about +1.5 degree. In the case of the scenario A1b, the gradient of increase of highly water-stressed population was less than that in the case of the scenario A2. When the value of temperature anomaly was exceeding to about + 1.5 degree, the gradient of increase of highly water-stressed population became loose. On the other hand, the highly water-stressed population in the scenario B1 decreased when the temperature anomaly was exceeding to about +1.2 degree. According to the estimation of the highly water-stressed population when the effect of climate change was ignored (that is, runoff was not changed), the highly water-stressed population was almost same. This result implied that it is strongly contributed by not the climate change but the socio-economical factors (ex; an irrigated area, increase of industrial water use, increase of population itself).

Here, the regional property is shown. The highly water-stressed population over the North America (region 1) is evaluated in each scenario. At the present, the highly water-stressed population ratio is about 32 %. It is obvious that there are few differences between scenarios A1b and A2. Up to the temperature anomaly is 0.6 degree, the highly water-stressed population ratio increases to about 40 %. On the other hand, under the scenario B1, when temperature rises more than 1.0 degree, the ratios decrease and reach the level almost same as the present. When we look at the Latin America (region 2), we can see that there are few differences between scenarios A1b and A2. The highly water-stressed population under the scenario B1 is greater than that under other scenarios in 2020s and 2050s. In Europe (region 3), there are few differences between scenarios A1b and A2. The decrease of the highly water-stressed population under the scenario B1 exist from 2050–2080. Middle-east and northern Africa (region 4) is very serious situation what the highly water-stressed population is large in present. In region 4, the ratio of the highly water-stressed population increase from 70 % (present) to 90 % (2050s) under all scenarios. In the border region of Sahara (region 5), the highly water-stressed population ratio is about 5 times up to 2050s. In case of CIS (region 6), the highly water-stressed population ratio increase under all scenarios exceeding to about +1.5 degree. In Asia (region 7), the highly water-stressed population ratio is already high in present. Nevertheless the ration of the highly water-stressed population is increase from 55% to 80% under the scenario A2. Under the others scenarios, the ratio of the highly water-stressed population increase about 10%. Oceania (region 8) is the region where the ratio of the highly water-stressed population is small. Up to +1.0 degree, the ratio of the highly water-stressed population has no change. When the anomaly temperature is exceeding to +1.5 degree, the ratio of the highly water-stressed population is doubled under the scenarios A1b and A2.

Parry et al. (2001) pointed out that the influence on the water risk by the climate change is serious when the anomaly of temperature is exceeding to +2 degree. However, our assessment disagrees with their assignment. When the highly water-stressed population assessment is estimated within the social elements (ex., the increase of irrigation demand, industrial demand, and population itself), the climate change is not so effective.