

Supplementary material to Section 2.1 in the manuscript.

Calculation of the population projections

The population projections were calculated using the exponential growth model (World Bank, 2012) within each year. Exponential growth rate, r is calculated as follows:

$$r = \ln(p_{(n+1)}/p_n) \quad \dots (1)$$

Here, p_n and $p_{(n-1)}$ are mid-year populations of two consecutive years, n and $n+1$ ($n \in \mathbb{N}$). In the UN data employed in the research, and therefore, in our own population projections r is expressed in percentages.

The population scenario SC1, which assumes no population reduction policies targeting climate change adaptation other than the population control programs in effect even at present. SC1 derives the trends of annual national population growth rates (exponential growth rates) exploring 60 years of previous data of each country, taken from World Bank (2012). Therefore, SC1 assumes that the same trends in population growth rates will continue until the year 2100.

The assumption on the population reduction policy scenario SC2 is the outcome of the policies, assumed as a reduced national growth rate of a country. However, the reduced growth rates are unique for each country with policy applied, and are described below.

China has a history of more than 3 decades of population control policies. The trends of population growth rates which could be expected out of such a population reduction policy (SC2) were assumed to be similar to that of China, at various stages of population transition (**Fig.2** in the manuscript). However, the effectiveness of such policies in practice, and therefore the expected outcome of such policies were assumed to be increasing with the economic ability of a country. I.e. Countries with high economic capacity will gain stronger reductions in the population growth rate than poorer countries by the same policy. Three categories of economic capacity were assumed (high income - HI, middle income – MI and low income – LI, by World Bank, 2012 definitions). Therefore, three unique trends of reduction in the population growth rate were assumed (**Fig. a** below) under SC2.

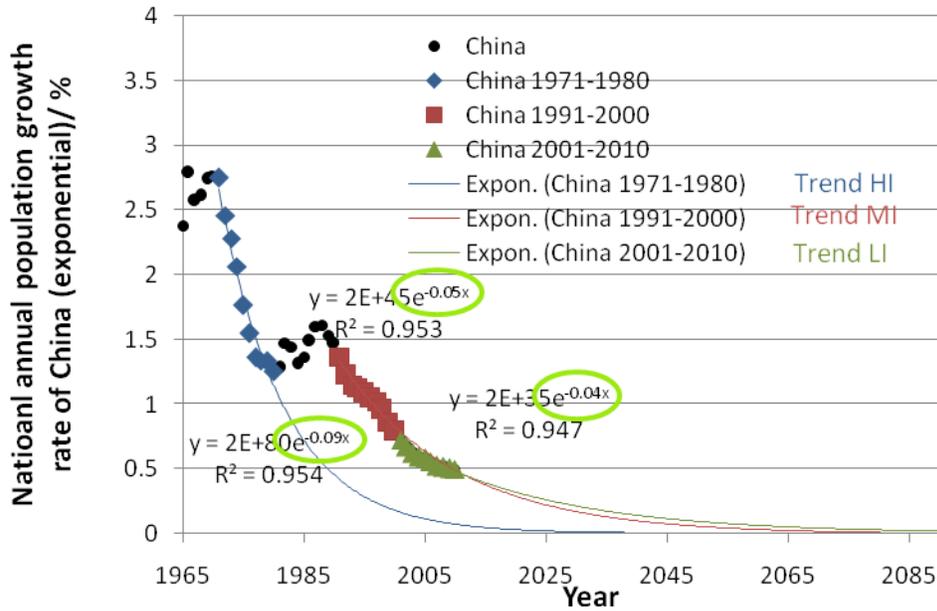


Fig. a The trends in the reduction of population growth rates assumed to be resulted in by the population reduction policy scenario SC2 (applied from 2011 to 2100). However, acknowledging the fact that the constant in the equations (A in the equations of type $y = A \cdot e^{bx}$) is a unique value for each country, only the exponential trends (bx) were applied for the countries. (x is the year since the start of the transition period)

The population projection scenario SC3 (**Fig 3(d)** in manuscript) assumes that by the time the countries reach the replacement fertility level, they have policies to keep the populations stabilized at that level, apart from the assumptions in SC2. Therefore, when these countries reach zero population growth, then it was assumed to be zero until 2100. Therefore, SC3 is having a global population higher than that of SC2. Nevertheless, the two scenarios have similar global populations, as SC3 assumptions for developed countries do not result in a high increase in population, globally.