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WATER, CLIMATE AND SOCIETY: THE ELEPHANT IN THE ROOM COULD BE OUR FRIEND

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A great university can do something unique in the face of seemingly insoluble problems. We are Philomaths – lovers of knowledge. We can ask questions that haven't been asked before. We can gather the evidence to make reasonable predictions of population and climate several decades ahead. We can look for solutions.

We can cross disciplines. This is what today's meeting is about.

This morning's presentations were eye-opening to say the least.

The elephant in the room that we have not recognized until now is population.

I want to suggest that this elephant is a friend. Among the many variables related to water and climate, human population may be among the most readily addressed.

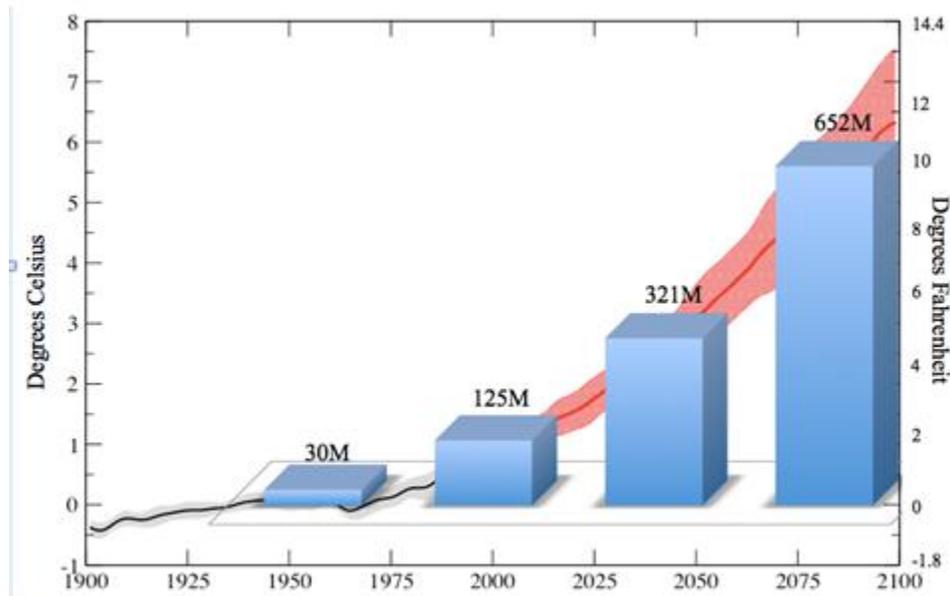
Population growth and water stress track together. Yemen, Afghanistan, Somalia, and parts of China and of India are literally running out of water. Growing populations in the Nile watershed (244 million today: 486 million in 2050) could produce insuperable problems by mid-century.

The population of Syria has tripled since 1950. It faced a serious drought between 2006 and 2010, killing 80 percent of the cattle. The rural areas had the least access to family planning and large families. Young men migrated to the cities looking for work – but found none. They turned to violence.

The 9/11 Commission got it right when they described “...a large, steadily increasing population of young men without any reasonable expectation of suitable or steady employment [as] – a sure prescription for social turbulence.”

My own work focuses on the Sahel, that million square mile semi-arid region where water, climate and population pose an imminent threat.

Developed countries’ emissions often disproportionately impact the least developed countries. In the Sahel temperatures are projected to rise by 2 to 3°C C by 2050 and – absent radical reductions in CO₂ emissions - by a stunning 5 to 8°C by the end of the century. Even a few days at very high temperatures can cause yields to plummet. This graph is for corn production, but it is the same for sorghum. .



Now add the population factor. The population of the Sahel has grown from 30 million in 1950 to over 100 million today. The medium UN projection is for over 300 million in 2050 – and a totally implausible 650 million at the end of the century.

Last September UC Berkeley and the African Institute for Development Policy hosted a multidisciplinary international called the OASIS conference: Opportunities for Advancing Solutions in the Sahel.

We brought together climatologists, demographers, experts in family planning, agriculture, national security, and those interested focus on the well-being and education of girls and young women. Such cross disciplinary skills, like those gathered here today, help diagnose problems of this scale, and create the possibility of solutions.

There are evidence-based solutions to many of the things that we see happening in relation to water, climate and society.

Let's go back to the elephant in the room.

Most climatologists, water experts, and those interested in biodiversity, tend to build their models on the medium United Nations population projection. But the high population and low projections are equally plausible.

So it's helpful to look closely at the variables involved in creating the low, medium and high population projections.

The common belief is that people have fewer children as they become more educated and richer.

In fact, it may be far simpler than that – access to family planning – independent of educational and economic factors - appear to be an essential driver of fertility decline.

The education of girls is an unfettered good, but it is NOT a prerequisite for fertility decline. X In 2009 the *Philosophical Transactions of the Royal Society* published an issue based on an international conference hosted by the Bixby Center at Berkeley. [It was in volume 364 because there has been one volume per year since the Royal Society was founded.]

The consensus of the conference was that family size will fall, even among illiterate women living on a dollar a day, when voluntary family planning is made available in ways that respect women. As we will see, there are many examples of this empirical fact.

Unless women have the information and technology they need to separate sex from childbearing, the default position is a large family. There are a great many unjustified

barriers and massive levels of misinformation that commonly prevent women from using modern contraception.

Even here in the US, we keep oral contraceptives on prescription when epidemiologic evidence tells us they are lot safer than aspirin. The American College of Obstetrics and Gynecology endorses over the counter sale of oral contraceptives, yet the Pill remains on prescription.

Many women in the Sahel say they never want another child or they don't want another child for the next two years, just like their counterparts in the developed world, but they lack access to modern contraception.

I have seen first-hand how rapidly countries can go through a demographic transition, once women are given the means to choose when to have a child.

The total fertility rate (TFR) is the average number of children a woman will have in her fertile life.

When contraception and abortion were illegal here in the US, it took 58 years (1842 to 1900) for the TFR to fall from 6 to 3.5 children. When modern family planning was available in Thailand, the same transition took 8 yrs (1969 to 1977).

Where family planning is less accessible, as in the Philippines or Pakistan, the TFR falls more slowly.

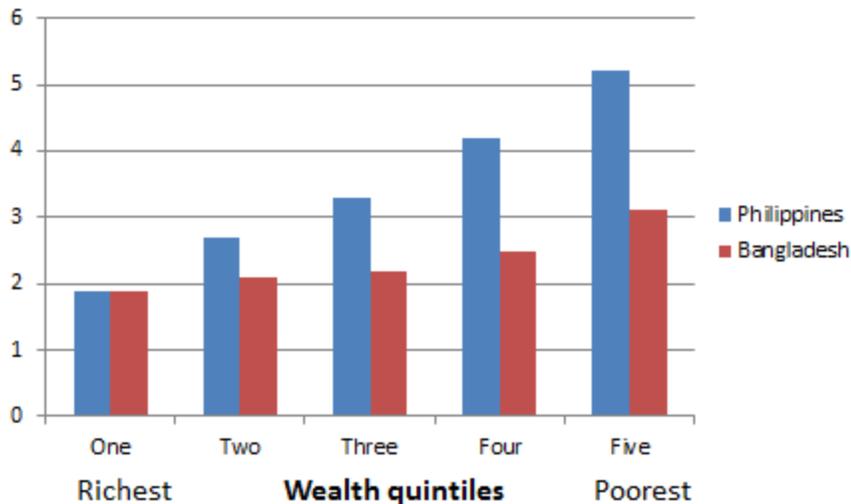
We associate the Islamic Republic of Iran with conservative ways, but once women were given realistic access to family planning, the total fertility rate actually fell more rapidly than in China - and without a one child policy.

Some people still think that discussion about population somehow implies coercion. The reality is that family planning is listening to what women, want not telling them what to do.

This chart tells the whole story. Where family planning is difficult to get, as in the Philippines where the bishops thwart access to contraception, then rich, educated women have fewer than two children, while those in the lowest economic quintile have over five. Where family planning is easy to get as in Bangladesh – a country poorer, less educated and with twice the infant mortality rate than then the Philippines - then the difference in family size between rich and poor largely disappears.

When the barriers that previously prevented women from separating sex from childbearing are removed, then family size always falls.

Total Fertility Rate by economic quintile: the Philippines and Bangladesh



The elephant in the room should be our friend.

Voluntary family planning and its potential impact on slowing rapid population growth in a human rights framework is not the only factor influencing the future of water, climate and society. But changing policies and investing in family planning is an unambiguous prerequisite for ameliorating the somber problem of global warming, water shortage and conflict and political instability facing the planet.

We need to learn that the Pill is mightier than the sword

Melinda Gates got it right when she said, “The most transformative thing we can do is to give people access to birth control.”

Family planning is critical for both mitigation and adaptation to climate change. X Half of all the pregnancies in the US are unintended. Averting an unintended birth eliminates a lifetime accumulation of carbon emissions. A federally funded family planning program in California, called Family PACT, offers contraception to women living below 200% of the poverty line.

A 2002 evaluation found Family that PACT averts almost 300,000 unintended births annually. By improving access to voluntary family planning, Family PACT not only improves the lives of women and the health of their families, but it reduces carbon emissions in California by 400 million tonnes.

Family planning can be one 'wedge' in mitigating carbon emissions in the North, and it can be more cost effective than windmills or solar power.

California: Family PACT

- 2009-10: 2,183 providers, 1.82 million clients
- 2007: 296,000 unintended pregnancies averted
- US expectation of life = 78.6 years
- US carbon emissions/year = 17.2 (metric tons)
- Reduction emissions = 400 million tons
- Cost carbon (2013 \$5/ton) = \$2,008 million tons

Ref: http://www.familypact.org/Providers/Fact-sheets/2012-0228_FamPACToverview_factsheet_ADA.pdf

Family planning can help countries in the South adapt to climate change. The regions with high population growth and water scarcity also often have the highest unmet need for family planning.

Bangladesh could face serious challenges as a result of rising sea levels. The fact that tens of millions of women now have two children does not solve this problem but Bangladesh is more likely to adjust to climate change than Pakistan, which by 2050 will have more people than now live in the United States, squeezed into a space little larger than Texas. The population of Karachi has jumped by 80% in one decade – the fastest urban growth on the planet.

The global population has more than tripled in my lifetime, not because women are having more babies, but because more children **are surviving** to reproduce in the next generation. Tragically the global effort to reduce infant mortality has not been matched by a similar effort to make family planning accessible

Partly as a result of these mistakes, 98% of future population growth on this planet will take place in developing, and especially the least developed countries.

One trouble is, we are numbed by numbers. We have seen so many bar charts that we don't translate them into living, breathing, suffering human beings.

We are anguished over the violent deaths of 100,000 people in Syria, saddened by 30 million deaths from HIV-AIDS. We haven't even begun to try and think about a world where, if we continue business as usual, hundreds of millions of children, women and men could die prematurely.

Half the population of the Sahel lives on one dollar a day or less, and 70% depend on the land for employment.

The UN Population Division publishes global population projections to the end of the century: low 6.2 billion; medium 8.2 billion; high 15.8 billion.

The one certainty, unless we invest in family planning, is that the world will become even more unequally divided between rich and poor than it is today.

The 'haves' & 'have-nots'

	2010	2100	2100
		Low variant	High variant
World total (billions)	6.9	6.1	15.8
Least developed countries (billions)	1.2	2.8	6.2

The difference between the high and low variants – almost 10 billion - rests on the assumption that women will have an average half a child above, or half a child below, the medium variant.

As an obstetrician, I find 'half a child' has a Monty Python ring about it, but I think we all understand what these projections mean.

I hope I have presented evidence that policies to make family planning readily available, together with modest investments in training and where needed, subsidizing the cost of contraceptives, can easily push the total fertility rate down by half child.

Virtually all ecologists, and those committed to feeding the future will agree that a world of almost 16 billion will never happen because death rates would rise due to lack of food and increasing conflict over limited resources.

I believe that as scientist the essential question facing us in the 21st century is:



Most biologists agree that we have already exceeded– or will shortly – exceed the capacity of the planet to sustain human numbers and human consumption. Some economists and engineers do not see this problem.

Bridging that intellectual gulf is vital. I don't know what that bridge will look like. I do know that Berkeley may be better placed than any other university to construct such a multidisciplinary connection.

Some of my grandchildren could be alive in 2100. Only a university can create evidence based scenarios for so far ahead. I suggest that Berkeley with its leadership in water, in climate change and population and family planning is better placed than any other US university to make the long term projections.

We are a university rich in skills. We are not afraid to ask difficult questions. As today's presentations demonstrate we are getting pretty good at the processes we need to 'advance solutions,' whether in relation to problems of water, climate and population in California, or half way across the world in Africa.

There isn't always the political will to put those solutions in place. But, at least in Berkeley, there is the academic will to define and refine solutions to overarching problems.

I would like to thank the Philomathia Foundation for their support. On behalf of our Bixby Center, I want to invite my colleagues in other disciplines to follow up this meeting by exploring the synergy between population, family planning, food security, water scarcity and conflict and terrorism with a new sense of urgency.

Thank you.

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