

# The Consequences of Intergenerational Negotiations on Climate Change

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# Negotiations over Climate Change

- Climate change is the sort of issue that mankind has never faced before.
  - The issues comprise of:
    - establishing scientific facts regarding the phenomenon.
    - determining the impacts, adaptation, and vulnerability.
    - implementing mitigation policies. (See IPCC reports)
- At every step (esp. the third step), we need to reach agreements to cope with the problem together.
  - Since there are many stakeholders, reaching agreements will not be easy.
  - One critical phase of agreement will be the target-setting of GHG reduction by country or region.
  - We have already observed this issue at the last COP meeting.

# My Talk today

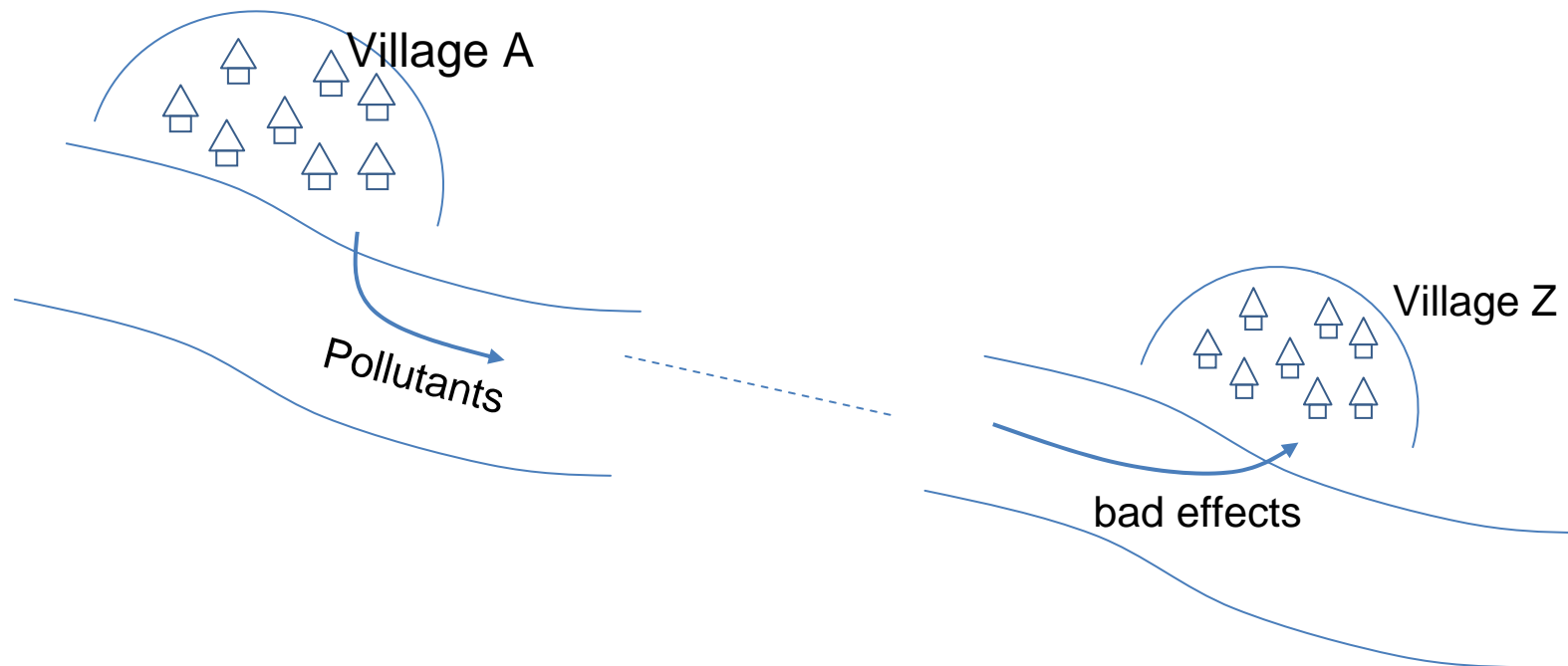
- is on the role and consequences of negotiations on climate change issues.
  - Is it possible for the international community to succeed in such complicated negotiations and reach agreements?
  - If so, how can this be done?
- Typical climate change negotiations will be those between countries or regions (i.e., international negotiations).
- This talk highlights INTERGENERATIONAL negotiations.

# A Typical Argument Since the 1970s

- People living now rarely imagine the far-distant future in which they will never live.
  - People in the present generation continue to consume resources and emit carbons and other pollutants, and have no concerns for the far-distant future generations.
  - As a result, future generations will have to pay for this lack of concern.
- A pessimistic deduction is that
  - The earth will meet with a catastrophe.
  - “The Limits to Growth” (1972) are inevitable.
  - “Doomsday” is coming.

# Example: Villages along the River

- We live in Village A.
- Beyond us, there may be many villages along the river.



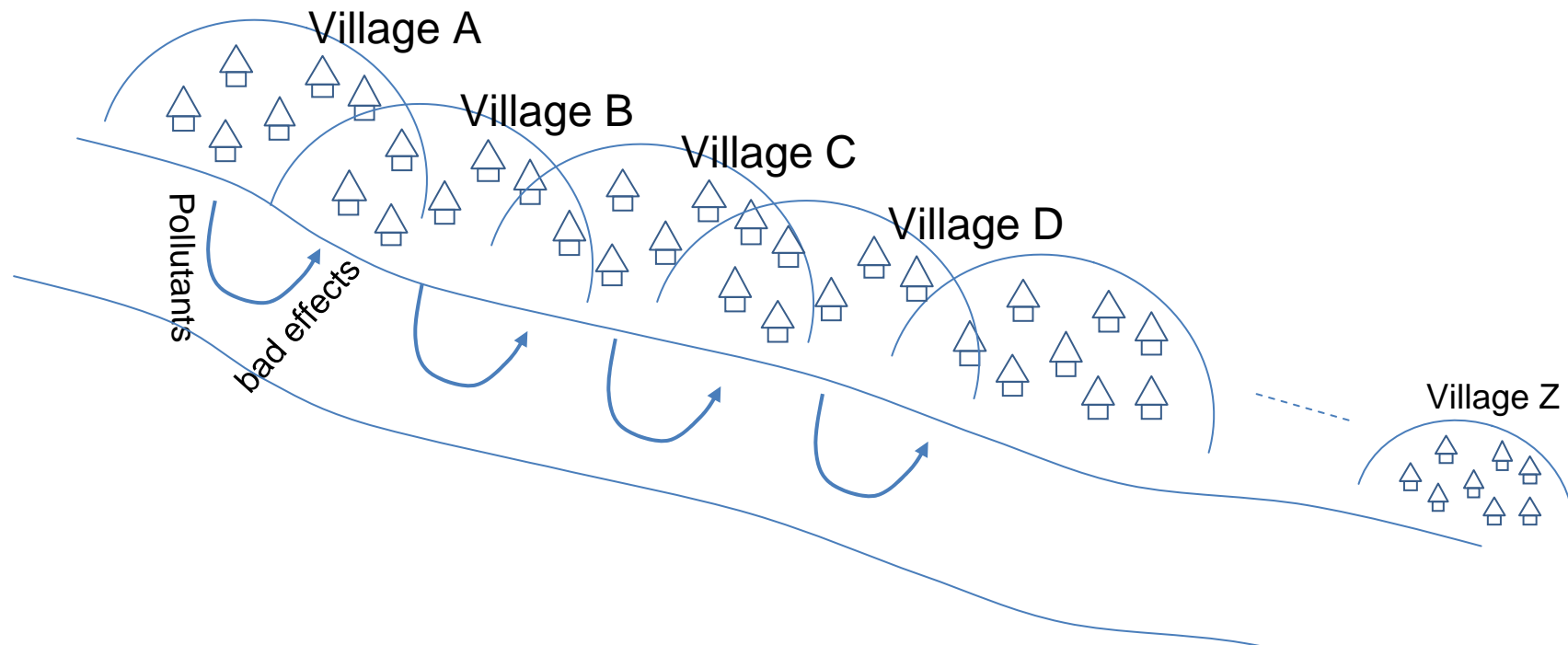
- Our daily life that creates pollutants, may harm other villages.
- But we do not care about them, because we have never seen them.

# Whose Problem?

- Again, we are living at the upper-river village, and we will not care about the effects of our lives on other villages along the river below us.
  - This is partly because of our ignorance of their lives.
    - The fact that we have never seen them, and we cannot even see them or talk to them.
  - But this is not the whole story.
- This is because we do not have any opportunity to share anything with them.
  - Their lives are separate from ours.
  - They are not our stakeholders.
- Thus, the pollution cannot be our problem.

# Village Example, again

- Do these people really share nothing with us?
- If the nearby villages are close to each other, and share parts of their territories, what would happen?



- Pollution is not just their problem: it becomes OUR problem!

# The Chain of Generations

- Consider:
  - Fathers (G-1)
  - their children (G-2)
  - their grandchildren (G-3)
  - their great-grandchildren (G-4)
  - .....
  - their great, great, ... grandchildren (G-N)
- Social Welfare of G-1
  - = their own Utility + [Social Discount Factor] x Social Welfare of G-2
- Social Welfare of G-2
  - = their own Utility + [Social Discount Factor] x Social Welfare of G-3

# Recursive Structure

- Social Welfare of G-1
  - = G-1's Utility + [Social Discount Factor] x Social Welfare of G-2
  - = G-1's Utility + [Social Discount Factor]
    - x {G-2's Utility + [Social Discount Factor] x Social Welfare of G-3}
  - = G-1's Utility + [Social Discount Factor] x G-2's Utility
    - + [Social Discount Factor]<sup>2</sup> x Social Welfare of G-3
  - = G-1's Utility + [Social Discount Factor] x G-2's Utility
    - + [Social Discount Factor]<sup>2</sup>
      - x {G-3's Utility + [Social Discount Factor] x Social Welfare of G-4}
  - = G-1's Utility + [Social Discount Factor] x G-2's Utility
    - + [Social Discount Factor]<sup>2</sup> x G-3's Utility
    - + [Social Discount Factor]<sup>3</sup> x Social Welfare of G-4
  - = .....

# The Form of Social Welfare

- Social Welfare of G-1

$$\begin{aligned} &= 1 \times \text{G-1's Utility} \\ &+ [\text{Social Discount Factor}]^1 \times \text{G-2's Utility} \\ &+ [\text{Social Discount Factor}]^2 \times \text{G-3's Utility} \\ &+ [\text{Social Discount Factor}]^3 \times \text{G-4's Utility} \\ &+ [\text{Social Discount Factor}]^4 \times \text{G-5's Utility} \\ &+ [\text{Social Discount Factor}]^5 \times \text{G-6's Utility} \\ &\dots\dots\dots \\ &+ \\ &+ [\text{Social Discount Factor}]^{N-1} \times \text{G-N's Utility} \\ &+ \dots\dots\dots \\ &(\text{to infinity}) \end{aligned}$$

# Implications of the Form

- Social Welfare of G-1  
= the sum of all future generations' discounted utilities.
- This form of social welfare indicates that  
in pursuing its own welfare, the present generation (G-1) cannot ignore all future generations' utilities.
- Implication:  
If each generation shares part of its welfare with its next generation, and thus realizes the importance of helping the next generation; and if such a chain of generations continues forever, then Doomsday will never come.

# Conclusion

- Pessimistic View:
  - The selfishness of the current generation will inevitably lead mankind to Doomsday.
- Optimistic View:
  - The “selfish” people of the current generation will logically and automatically try to avoid Doomsday, with the guidance of an “invisible hand.”
  - Sufficient conditions:
    - Parents will/should take care of their children.
    - Such a social canon (norm) should be observed forever.
- The key factor is the degree of care, which is represented by the “social discount factor” or “social time preference.”

# Appendix

# Social Time Preference

$$SW = \sum_{t=1}^{\infty} \underbrace{\left( \frac{1}{1+\rho} \right)^{t-1}}_{1 > \text{Discount Factor} > 0} U(C_t)$$

$\rho$ : Social Time Preference  
 $0 < \rho < \infty$

$$\rho \rightarrow 0$$

$$SW \rightarrow \sum_{t=1}^{\infty} U(C_t)$$

altruism in respect  
to future generations

$$\rho \rightarrow \infty$$

$$SW \rightarrow U(C_t)$$

completely egoistic parents  
= typical pessimistic view

## Social Time Preference (cont'd)

$$SW = \sum_{t=1}^{\infty} \left( \frac{1}{1+\rho} \right)^{t-1} U(C_t)$$

$\rho$  : Social Time Preference

$$0 < \rho < \infty$$

In Economic theory,  
social time preference is closely related to market interest rate.  
They are not equal to each other.

However, it is known:

$$\begin{aligned} [\text{market interest rate}] &= [\text{social time preference}] \\ &+ [\text{coefficient}] \times [\text{per capita economic growth rate}] \end{aligned}$$

and

in the long run, they converge to each other.

Notice that the construction is still among debatable issues,  
affecting policy making positions.

# The picture is not that simple, but...

## The Pessimistic View

- Scientists, technology-based people
  - The Club of Rome's *the Limits to Growth* in 1972
  - Computer simulation technique "System Dynamics" (by Forrester and Meadows, MIT)
  - support the role of technology.

## The Optimistic View

- Economists
  - esp.
    - Neoclassical (following Adam Smith; Anti-Keynesian)
    - Believe in the power of the market mechanism

Economic growth theory (1970-)

New growth theory (1990-)

focusing on "endogenous growth."

"Even resource depletion is resolved by technological change and R&D which are driven by the growth itself."

# The picture is not that simple, but...

## The Pessimistic View

- Democrats?
  - *The Global 2000: Report to the President – Entering the Twenty-First Century* in 1980 under the Carter administration
  - Al Gore's *Inconvenient Truth*
- Anti-growth?
- prefer government-committed R&D projects
  - MIT?  
committing to many space projects and the like.

## The Optimistic View

- Republicans?
  - consider family value as important
  - support industry, esp. energy industry, and the Wall street
- Pro-growth?
- hate government interventions to the market
  - Stanford ?  
the core of the Silicon valley.