

# The Mitigation-Adaptation Connection: Milestones, Synergies and Contradictions

When most local and tribal governments think of climate protection, they think first of **mitigation** – actions to reduce the amount of human-caused greenhouse gas emissions, to avoid further disruptions to the Earth’s atmosphere. But while effective mitigation action is crucial, it is not the only aspect of climate protection that local governments can engage in. **Adaptation** is the other half of comprehensive climate protection. Adaptation involves recognizing impacts of climate change that are *already* occurring and will continue into the future, and planning ahead to maximize the positive aspects of these impacts while protecting lives, health, property and ecosystems from the negative ones.

This primer will briefly describe climate change mitigation planning and adaptation (or resilience) planning. It will discuss where and how local governments engaging in ICLEI’s Five Milestones for Mitigation process can integrate the Five Milestones for Adaptation. It will highlight synergies between mitigation and adaptation actions that local governments can take advantage of in order to maximize the benefits of their efforts. It will also provide examples of mitigation and adaptation actions that may contradict one another.

## The difference between mitigation and adaptation

The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (2007) defines mitigation and adaptation as:

**Mitigation:** Implementing policies to reduce greenhouse gas emissions and enhance sinks.

**Adaptation:** Initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects.

Another way to think about it is to consider mitigation as activities to protect nature from society, while adaptation constitutes ways of protecting society from nature.<sup>1</sup>

A further difference between mitigation and adaptation lies in who takes action and who benefits. With mitigation, local and tribal governments can take actions that result

in global benefits. For adaptation, local and tribal governments can also take action, but the benefits are more local.

Most of the climate actions that ICLEI's local government members have focused on so far are intended to reduce greenhouse gas emissions by lowering energy use, cutting vehicle miles traveled, cleaning up emissions from industry and utilities, etc. – in other words, *mitigation* actions intended to avoid worsening climate change by slowing the rate at which greenhouse gas emissions are being added to the atmosphere.

While mitigation is a crucial part of climate action, it cannot be the only one that local and tribal governments focus upon if they want to protect and improve their long-term sustainability. As the IPCC Third Assessment Report noted, "Owing to the lag times in the global climate system, no mitigation effort, no matter how rigorous and relentless, will prevent climate change from happening in the next few decades."<sup>ii</sup>

Therefore, local governments must also consider *adaptation* – that is, planning and preparing for the impacts of climate change that are currently occurring and can be expected to continue in the coming decades due to existing and perhaps increasing greenhouse gas levels.

Adaptation is receiving increasing attention in the media and in national and international policy circles, and was a major focus at the December 2009 international climate change meetings in Copenhagen, Denmark. The results of a recent study highlight its long-term importance: a team of NOAA researchers found that once carbon dioxide is emitted, it persists in the atmosphere and oceans, and will continue to affect the climate for centuries to come.<sup>iii</sup> The researchers estimate impacts to the U.S. that are anticipated in the next few decades, such as sea level rise and Dust-Bowl like drought in the Southwest, will persist for at least a thousand years, regardless of how much greenhouse gas emissions are reduced.

### Five Milestones for Mitigation AND Adaptation

ICLEI member local and tribal governments are making great strides in completing the organization's Five Milestone for Climate Mitigation process:

1. Conduct a baseline emissions inventory and forecast
2. Adopt an emissions reduction target
3. Develop a Local Climate Action Plan
4. Implement policies and measures
5. Monitor and verify results

ICLEI is ramping up its ability to assist local governments with a sister strategy to mitigation - adaptation planning - through its Climate Resilient Communities (CRC) program. The CRC program also has a Five Milestone process, the Five Milestones for Climate Adaptation:

1. Conduct a resiliency study
2. Set preparedness goals
3. Create Preparedness Plan
4. Implement Preparedness Plan
5. Monitor and evaluate results

As you can see, the two processes are similar, particularly in steps 2-5. Local governments can save time and effort and make both their mitigation and adaptation efforts more effective if they consider actions that will provide benefits for meeting both sets of objectives. However, they should also be aware that some mitigation actions may work against adaptation goals, and vice versa.

As the 2007 IPCC Fourth Assessment Report notes: “There is high confidence that neither adaptation nor mitigation alone can avoid all climate change impacts; however, they can complement each other and together can significantly reduce the risks of climate change.”

There are three primary ways local governments can integrate mitigation and adaptation planning processes:

- A. Local governments that are beginning climate action planning can create a single plan that combines mitigation and adaptation actions. This will require following Milestones 1 and 2 for both mitigation and adaptation, and then carefully considering the findings of the emissions inventory, forecast and target, along with the results of the resiliency study. Actions that provide both mitigation and adaptation benefits can then be chosen and prioritized in the plan and implemented together.
- B. Another option, for local governments that have already conducted their emissions inventory and set targets, would be to pause before choosing their mitigation actions to conduct a resiliency study in order to better consider how to achieve both sets of goals to maximize the benefits of the actions they choose to include in their plan.
- C. Finally, local governments that are already working to implement a mitigation-focused plan and/or monitor and verify their results can engage in adaptation planning as the second phase of their climate protection program. They can consider how the mitigation actions they have prioritized will affect their adaptation efforts, and may decide to include additional actions to maximize co-benefits or eliminate actions that work against adaptation goals.

## Synergies

Despite significant differences between mitigation and adaptation, there is more common ground between them than might at first be obvious. Some of the major actions that local governments may be taking to mitigate future climate change also have adaptation benefits. The tables below summarize how some climate action measures can work synergistically to achieve greenhouse gas reductions while at the same time making communities more resilient to expected climate change impacts.

Energy	
Mitigation	Adaptation
Reduce emissions by expanding use of renewable sources	Reduce vulnerability to widespread power grid outages by encouraging distributed generation from multiple renewable sources (solar, wind, biogas, landfill methane, etc.)
Reduce emissions by improving efficiency of energy and water delivery systems	Reduce potential for grid overload and failure by decreasing demand.

Green Building Strategies	
Mitigation	Adaptation
Reduce emissions by curbing energy use through greater efficiency	Lower energy use will create less demand on the grid during extreme events such as heat waves, decreasing the likelihood of blackouts
Adopt or encourage LEED building standards for commercial, residential, retrofit and municipal projects	Building standards could include greater resistance to high winds, flooding, etc.
Implement a weatherization program	Better insulated buildings that rely on day lighting and natural ventilation will be more functional and comfortable during power disruptions, reducing the potential for heat- or cold-related illness and death during power supply disruptions

Food Production and Distribution	
Mitigation	Adaptation
Reduce emissions by encouraging local food production through local agriculture, community gardening, etc. to decrease the number of miles food must be transported	Reduce reliance on centralized food system where commodity production is concentrated in a few locations that may be vulnerable to climate disruptions such as storm damage, pest outbreaks, etc.



<b>Forestry and Open Space</b>	
<b>Mitigation</b>	<b>Adaptation</b>
Increase carbon sequestration by promoting healthy forests (including urban forestry) and natural open space	Reduce vulnerability to flooding by promoting functional watersheds, including healthy forests and open space
	Increase habitat available to climate-stressed species by protecting open space
	Counteract urban heat island impacts by planting trees to provide shade and cooling

<b>Smart Growth and Transportation Strategies</b>	
<b>Mitigation</b>	<b>Adaptation</b>
Reduce emissions by decreasing vehicle miles traveled through compact development	Improve delivery of disaster assistance and reduce costs of rebuilding
Promote high-density and in-fill development through zoning policies	Reduces area that emergency personnel must cover, making delivery of disaster assistance more efficient
Institute growth boundaries, ordinances or programs to limit suburban sprawl	
Give incentives and bonuses for development in existing downtown areas and areas near public transit	Makes evacuation easier and more efficient
Discourage sprawl through impact, facility, mitigation, and permit fees	Reduces number of miles and costs of repairing or replacing infrastructure (i.e. roads, bridges, electrical and sewer lines) when climate-related disaster strikes; also reduces fragmentation of ecosystems, allowing them to function more effectively.

<b>Water</b>	
<b>Mitigation</b>	<b>Adaptation</b>
Reduce emissions by reducing water use (less energy required for treating and transporting water)	Conserve water so more is available during more frequent and severe droughts

These are only a few examples of synergies between mitigation and adaptation actions. Local and tribal governments are likely to find others as they look for solutions that will work for their communities. The key is to consider BOTH:



- How much, and at what cost, a particular action will reduce greenhouse gas emissions; and
- How effective a particular action will be at reducing climate-related risks to lives, health, property and ecosystems

## Contradictions

Although there are many examples of how mitigation measures may provide adaptation co-benefits and vice versa, the opposite can also be true: some adaptation measures may increase greenhouse gas emissions and therefore work against mitigation; while some mitigation measures may increase climate-related risks to lives, health, property and ecosystems, and therefore work against adaptation.

Several factors may add to the contradictions between mitigation and adaptation efforts<sup>iv</sup>:

- Different time horizons (i.e., the longer-term perspective of mitigation strategies vs. the shorter term needs of adaptation);
- Differences in administrative scales: mitigation can be managed at national and international scales (as well as by local and tribal governments), while most adaptation planning and implementation must occur at the local and regional level; and,
- The different stakeholders involved in each, such as energy and transportation officials primarily engaged in mitigation efforts while public health and emergency management personnel are more likely to be involved with adaptation planning.

Here are some potential contradictions to consider between mitigation and adaptation planning actions:

**Land use planning:** Increasing the building density of urban areas can be an effective mitigation action because it reduces vehicle miles traveled and can make public transportation more feasible and efficient. However, increasing density may lead to the loss of trees, parks and permeable surfaces, which can prevent floodwater absorption and increase flood damage.

**Urban heat island effects:** Increasing building density in hot areas may block air circulation that would have otherwise carried away excess heat generated by air conditioners and absorbed by buildings and pavement. This “urban heat island effect” can work against efforts to adapt to hotter temperatures by raising temperatures in built-up areas, increasing both the public health threat of excessive heat and the amount of energy required to cool buildings. However, solutions such as installing light

colored roofing and pavement materials, strategic use of vegetation for shade and cooling can both reduce the urban heat island effect and reduce the amount of energy required for cooling.

**Sea level rise:** As coastal cities seek to adapt to more intense storm surges and sea level rise, they may increasingly rely on pumps to keep critical infrastructure such as subways and water treatment systems operational. While greater use of pumps is a proactive adaptation measure, it requires more energy use, which works against mitigation goals.

**Water supplies:** With lower rainfall and higher temperatures causing drought to become more common in many areas, as well as increasing demands from higher populations, more flexibility in obtaining water supplies will be necessary. Increasing the capacity to transport water over long distances could therefore be an effective way of adapting to drought. However, moving water requires large amounts of energy, and thus works against mitigation efforts.

**Infrastructure:** Stronger infrastructure to deal with increased flooding, such as larger culverts and bridges, may also be a good adaptation strategy, but will require more materials such as steel and concrete. The production of these materials normally generates greenhouse gases, but new materials with less embodied CO<sub>2</sub> are under development.

The list of contradictions goes on – as does the list of actions that can reduce such contradictions and create win-win solutions. As local governments seek solutions to both mitigation and adaptation challenges, they must pause to reflect on the relationships between greenhouse gas emissions and reducing risk, and, where possible, choose actions that provide benefits for both goals, rather than those that will cancel each other out.

## Conclusions

Acknowledging that mitigation and adaptation are two sides of the same climate protection coin is crucial to both maximizing the benefits of actions taken, and also to ensuring that an action taken to promote one set of goals does not undermine the other. Not all mitigation actions will provide adaptation benefits of reducing the risks of negative climate change impacts to lives, health, property and ecosystems; nor will all adaptation actions avoid or reduce greenhouse gas emissions so that mitigation goals can be met.

The only solution is for local governments to clearly understand the significance of both mitigation and adaptation, and know how to evaluate the effects of particular actions



they are considering implementing for their effects on both objectives. It is possible to achieve balance between the two by acknowledging the trade-offs and complexities of comprehensive climate protection planning. The result will be towns, cities, counties and regions that are both more resilient to current and future climate impacts, and that reduce emissions to avoid making such impacts worse in the future.

To learn more about how your community can begin undertaking climate protection (mitigation and adaptation) efforts, see: [www.icleiusa.org/programs/climate](http://www.icleiusa.org/programs/climate).

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<sup>i</sup> Stehr, Nico and von Storch, Hans. October 19, 2005. Introduction to papers on mitigation and adaptation strategies for climate change: protecting nature from society or protecting society from nature? Accessed from sciencedirect.com, Jan. 29, 2009.

<sup>ii</sup> Working Group III Fourth Assessment Report (WGIII AR4), Chapter 11 (Barker et al., 2007); Working Group I Fourth Assessment Report(WGIAR4) (Christensen et al., 2007; Meehl et al., 2007)

<sup>iii</sup> Susan Solomon, Gian-Kasper Plattner, Reto Knutti, and Pierre Friedlingstein .Irreversible climate change due to carbon dioxide emissions. Proceedings of the National Academy of Sciences for the United States of America, December 16, 2008. <http://www.pnas.org/content/early/2009/01/28/0812721106.full.pdf+html>

<sup>iv</sup> Pizarro, R.E., The mitigation/adaptation conundrum in planning for climate change and human settlements: Introduction, Habitat International (2008), doi:10.1016/j.habitatint.2008.10.008.