



California Project WET Gazette

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The Godzilla Allegory

Godzilla returned to the big screen in May, looking more fit at age 60 than in his original appearance thanks to CGI (computer aided graphics), the animated equivalent of a Botox makeover. The great radioactive monster of movie legend first arose from the depths of the Pacific in the 1954 movie 'Gojira' as an allegorical warning of the horrors humanity may unleash in a post-World War II world flush with confidence in the ability of our science and technology to harness the awesome powers of nature. Though Godzilla is destroyed in the original movie, the Cold War terror was resurrected in a chain of movies loaded with nonsense only kids and diehard fans can love, that reshaped the underlying allegory in the process. It is the use of atomic weapons that is called into question in the original movie, but the role of science and technology in unbridled development, ocean pollution, genetic manipulation, space age



weapon technology and even human relationships are highlighted in the post-resurrection movies. After a half-century of battling the monster-sized embodiments of humanity's issues and the best efforts of arrogant, overconfident and usually power hungry beings to eliminate or control him, Godzilla has morphed from merely a horrible unintended consequence into a metaphor for the ultimate terrifying response of a natural world knocked out of balance. At the core of the Godzilla allegory are questions of how science and technology – in fact *all* the STEM (science, technology, engineering & math) fields – are interpreted and applied. It is no surprise the new movie has Godzilla wading ashore in California, where climate change is the Godzilla in the room and the science surrounding is at the center of a political and economic gyre of debate – as it is in the Godzilla allegory.

Humanity's relationship with our environment and the STEM fields is the central question of the Godzilla allegory, beginning with the product of the Manhattan Project – one of many major STEM initiatives of World War II. It is atomic weapon experimentation that awakens Godzilla and the development of an equally horrific device that destroys the creature in the original movie along with the morally torn creator of the device - and all life in Tokyo Bay. Despite the destruction he wreaks, Godzilla is not viewed through the lens of good or evil, but as a natural phenomenon with advocates for the value

of studying the creature to better understand its interrelationship with the issues causing it to appear. The advocates often caution it may be better to learn to live with Godzilla rather than trying to kill or control him, which leads to another allegorical thread – the lens being used to interpret and apply STEM or any other knowledge matters. A healthy dose of skepticism, debate and open minds are foundational bedrocks of good science, which are portrayed in the more well-rounded Godzilla storylines along with the dangers of maintaining a view despite evidence to the contrary. The movies highlight how the same information can generate different viewpoints. The ending of the original Godzilla movie is a case in point. ‘*Gojira*’ – the 1954 Japanese original – ends on a somber note that Godzilla's death has come at a terrible price and a warning that continued experimentation with nuclear weapons may awaken another Godzilla; whereas, the Americanized 1956 version ‘*Godzilla: King of the Monsters*’ ends on a more triumphant note that *"The menace was gone, so was a great man. But the whole world could wake up and live again."*

So how does the Godzilla allegory apply to California? California in the 1950s still riding a post-World War II victory high, brimming with confidence in our ability to apply STEM knowledge gained during the war for the benefit of society as well as defense – including the use of atomic weapons. Even as Godzilla was playing on the silver screen, Operation Plowshare was performing experiments to use nuclear devices for mining, water and oil production, enlarging harbors and road building – including a plan titled Carryall that would have used 22 devices to widen I-40 through California's Bristol Mountains. California was also on the leading edge of conventional STEM research, including the use of technological and engineering advancements to rein in or control the excesses of nature and was fully engaged in fighting two recurring phenomena plaguing the development in the Central Valley and other parts of the state –flooding in the north and drought in the south. Even as Walt Disney was touting the power of the STEM fields to create a Future World of our dreams, the Federal Central Valley and State Water Projects were building the infrastructure to bring that future closer to reality. The resulting system of dams, aqueducts, reservoirs, levees, pumping plants and power generators altered landscapes and natural processes on a statewide scale, transforming California into an economic powerhouse.

Our species has a historic tendency to favor immediate solutions to problems and not always look as close at the full-range of long-term consequences, but one also needs to remember any STEM project is usually inspired by a desire to gain knowledge that can benefit society. Operation Plowshare probably horrifies many reading this and may sound like a contender for a national Darwin award, but it was born out of a belief this power could benefit society in a way as grand in peace as it was terrible in war. Many may also breathe a sigh of relief that references to a Plowshare idea to use the devices to reshape the western Sierra to enhance water collection for dams in the Sacramento Valley never made it beyond the idea stage. However, even well-planned and widely hailed conventional projects can awaken unknown monsters of their own. Our water projects achieved their immediate goals of relieving flood and drought, while boosting water supplies for a growing population and economy; yet, nearly fifty years later we find ourselves struggling with collapsing fish populations, subsiding landscapes, new forms of water pollutants and multiple other threats to the central hub of our water system – the Delta – the surface water supply two-thirds of our population is reliant upon. In addition, there are multiple data sources indicating a rise in average temperatures, declining snowpack, rising sea level, greater variability in weather and seasonal patterns and a greater potential incidence for drought and flood - and a strong correlation rising carbon dioxide levels are driving this change and those levels have risen well beyond anything evidenced in the past 650,000 years. A very healthy dose of debate and questioning is occurring among natural resource managers and stakeholder groups over the STEM knowledge on these issues, how they interrelated to each other and how this knowledge will be applied to mitigate these issues for the long-term. However, there are a number of Californians who fail or refuse to fully recognize the Godzilla that has waded onto our shores for whatever reason – which usually ends with disastrous consequences for the scoffer and the nearest cities in a Godzilla movie.

Climate change is as natural of an occurrence as thunderstorms or the change of the seasons, but evidence indicates the present change is being fueled with the by-products of our technology to Godzilla-sized proportions. Research indicates a number of issues we are facing will feed off the larger monster in

the room, growing in size and frequency of recurrence beyond anything in recent history and a mix of mitigation measures that better integrate human and natural systems into an infrastructure has the greatest probability to can adapt to whatever the monster may throw at us. Unfortunately, while a number of Californians accept the science and math indicating a change in climate, their support for engineering and technological measures only go as far as mitigating historical variances and tend to favor human structures over restoration of ecological infrastructure – and evidence indicating a link to human actions and a change well outside of historical variances is dismissed. Thus, no action needs to be taken if one believes we are just experiencing a dry spell within the climate pattern of the past 200 years – the precipitation will return shortly and all will be fine. Focusing only on the current drought or recognizing past natural variances include multi-year ‘mega-droughts’ lead one to conclude more storage is the key – raising dam heights, new reservoirs, and if not tunnels, then at least a reform of water flow regulations to favor human needs for users reliant on water from the Delta. Add levees improvement to the list if an El Nino brings flooding this winter. Likewise, the removal of a major reservoir, dismissing the role of active forest or agricultural management in sustaining water supplies and biodiversity or advocating for mass desalinization all look pretty good if one doesn’t consider the full range of predicted impacts. Failing to understand the root driver of current climate change or the full-range of potential impacts before applying solutions is like spending billions on a fully armored, mechanized robot with the latest weapons and computer guidance systems – and forgetting Godzilla has a concentrated radioactive breath weapon that will fry anything!

Unlike Godzilla, climate change isn’t content with just our energy grid; it is targeting multiple systems from our water infrastructure to the ecosystems that support the agriculture, forests, fisheries and organisms that sustain California’s economic engine and our way of life. But, it also provides a wealth of opportunity to educate and engage citizens of all ages in the STEM fields with a deeper understanding of how this knowledge can be interpreted and applied from landscape scales to their backyard – which will be needed statewide to reduce the impact of this monster. I’ve also loaded the ‘[Websites of Interest](#)’ with more information on climate change, issues surrounding it and other items mentioned in the article.

“Whether you live in California, Texas or Timbuktu, climate change is real, and it’s long past time for action”
- Governor Edmund G. Brown Jr.

WEBSITES OF INTEREST

Indicators of Climate Change in California

<http://oehha.ca.gov>

The 36 indicators highlighted in the Office of Environmental Health Hazard Assessment (OEHHA) report show that climate change is occurring throughout California, from the Pacific Coast to the Central Valley to the Sierra Nevada Mountains. Impacts of a warmer climate include decreasing spring snowmelt runoff, rising sea levels along the California coast, shrinking glaciers, increasing wildfires, warming lakes and ocean waters, and the gradual migration of many plants and animals to higher elevations.

DWR: Climate Change 101

<http://www.water.ca.gov/climatechange/cc101.cfm>

The Department of Water Resources (DWR) recognizes that climate change is already impacting water and other resources in California and will continue to be a significant challenge for our built and natural environments in the future. [Climate Change Vulnerability Matrix](#) provides a summary of the likely impacts of climate change on the seven most important resource sectors. The matrix is a great addition to extend the Project WET activity ‘8-4-1, One For All (p: 299).

Climate Change: How do we know?

<http://climate.nasa.gov/evidence>

The Earth's climate has changed throughout history. Just in the last 650,000 years there have been seven cycles of glacial advance and retreat, with the abrupt end of the last ice age about 7,000 years ago marking the beginning of the modern climate era — and of human civilization. The current warming trend

is of particular significance because most of it is very likely human-induced and proceeding at a rate that is unprecedented in the past 1,300 years.

ProCon.org

<http://www.procon.org>

ProCon.org is a 501(c)(3) nonprofit public charity. The Problem We Are Tackling: The constant barrage of inaccurate, misleading, and biased news and information prevents many people from making informed decisions about important social issues. We promote critical thinking, education, and informed citizenship by presenting controversial issues in a straightforward, nonpartisan, and primarily pro-con format. The site includes a section on climate change: <http://climatechange.procon.org>

Skeptical Science

<http://www.skepticalscience.com>

Scientific skepticism is healthy. One should always challenge themselves to improve their understanding. Yet this isn't what happens with climate change denial. Skeptics vigorously criticize any evidence that supports man-made global warming and yet embrace any argument, op-ed, blog or study that purports to refute global warming. Do their arguments have any scientific basis? What does the peer reviewed scientific literature say?

CoolCalifornia.org

<http://www.coolcalifornia.org/schools>

CoolCalifornia.org's goal is to provide resources to all Californians so they can take action, reduce their environmental impact, and be part of the climate change solution. Join many school district officials, teachers, and students to stop global warming and save money by taking cost-saving actions to reduce greenhouse gas emissions. Check out resources ranging from climate calculators to curriculum and school case studies and learn more about how to make a difference!

California Data Exchange Center

<http://cdec.water.ca.gov/>

The California Data Exchange Center (CDEC) installs, maintains, and operates an extensive hydrologic data collection network including automatic precipitation and river stage sensors for flood forecasting. CDEC provides a centralized location to store and process real-time hydrologic information gathered by various cooperators throughout the State.

USGS Global Change

http://www.usgs.gov/global_change/

USGS science aims to understand the interrelationships among earth surface processes, ecological systems, and human activities. This includes understanding current changes in the context of pre-historic and recent earth processes, distinguishing between natural and human-influenced changes, and recognizing ecological and physical responses to changes in climate.

Regional Climate Centers

<http://www.wrcc.dri.edu/rcc.html>

NOAA's Regional Climate Centers (RCCs) are a federal-state cooperative effort. The six centers that comprise the RCC The climate data provided is a wealth of information one can use with Project WET activities ranging from *'Wet Vacation' (portal)* to a US focused adaptation of *'Piece It Together' (portal)*. Click the following link to find current California data summaries: <http://www.wrcc.dri.edu/monitor/cal-mon/index.html>

USGS: Changes in Streamflow Timing...

<http://pubs.usgs.gov/fs/2005/3018>

This USGS fact sheet summaries a study of trends toward diminished snowpack and earlier snowmelt in western states. Trends toward earlier snowmelt and streamflow, whatever the causes, threaten finely tuned water-resource and flood-management systems and procedures in many western settings. This fact sheet goes well with the Project WET activity *Blue River (p: 135)*.

Is the West's dry spell really a megadrought?

<http://www.sacbee.com>

A new study has revealed a previously unknown multi-decade drought period in the second century A.D. The findings give evidence that extended periods of aridity have occurred at intervals throughout our past.

Almost 900 years ago, in the mid-12th century, the southwestern U.S. was in the middle of a multi-decade megadrought. It was the most recent extended period of severe drought known for this region.

Aquaforia

<http://www.aquaforia.com>

The Water Education Foundation's news aggregator is a great place to research different viewpoints on the climate change, drought, flood – and any other California water topic. The above link will take you directly to current articles on climate change and water supply from both traditional and non-traditional news sources, presenting the many sides and views of the water picture, with the goal of fostering understanding of various positions and discussion toward resolution of these often controversial issues.

Plowshare Program

<https://www.osti.gov/opennet/reports/plowshare.pdf>

The U. S. Atomic Energy Commission established the Plowshare Program as a research and development activity to explore the technical and economic feasibility of using nuclear explosives for industrial applications. Possible excavation applications included: canals, harbors, highway and railroad cuts through mountains, open pit mining and construction of dams. You can also view several AEC produced videos on the project on YouTube: <https://www.youtube.com/watch?v=eIsUMK4-csM>

Godzilla vs. Technology

<http://www.vnews.com/news/business>

It rose up out of the sea, a fearsome, roaring monster unlike anything humans had ever seen: horrible, primeval, unstoppable, towering, breathing radioactive fire and leaving total destruction in its wake. No, this was not Godzilla... This monster was the founding inspiration for Godzilla: the fearsome hydrogen bomb explosion known as Castle Bravo, a test detonated earlier that year in the Pacific that gave birth to far more than cinema's most famous monster.

If you would like more information on Project WET please contact Brian Brown, California Project WET Coordinator at: projectwet@watereducation.org or (916) 444-6240.

Check our website www.watereducation.org and/or contact us for updates.