

Priority 1 Summary

Highlights:

-Predicted climate change effects in Washington state: increased annual heating energy demand, increase in annual cooling energy demand, decrease in crop yields, reduction of viable salmon habitat, increase in forest fire damage, spatial and abundance shifts in Mountain pine beetle outbreaks (increase tree mortality), increased shoreline erosion, increased human mortalities (Miles et al., 2010)

Climate Change and Food Webs:

-Salmon & shellfish are culturally important First Foods to local indigenous tribes (Donatuto et al., 2014; Montag et al., 2014)

-Sea level rise and other climate change effects may result in up to 75% loss of local Indigenous tribal shellfish habitat by 2100 (Donatuto et al., 2014)

-Oceanic temperature increases, precipitation pattern changes and declining water supply will affect salmon population size and health (Montag et al., 2014)

-Salmon provide ecosystem services ranging from healthy wetland functioning (e.g., water filtration, flood control), to nutrient provision for neighboring croplands (Bottom et al., 2009)

-Salmon are a keystone species that serve as ecosystem engineers, provide sustenance for local communities, provide economic opportunity, and recreational benefits (Bottom et al., 2009)

Climate Change in Rural Communities:

-Natural resource industries heavily dependent on climactic conditions/weather patterns and ecosystem services (e.g., pollination)

-Uncertain future for these industries/professions paired with declining interest in these fields from younger generations (Hammond et al., 2013)

-Preparation for future climactic events could entail expenditures for preventative measures (e.g., riparian buffers; Hammond et al., 2013)

-Changing regulations- e.g., salmon habitat protection, ecosystem recovery (Hammond et al., 2013)

-Declining snow runoff, earlier peak runoffs, increased variability of cool season precipitation (challenges to water allocation, flooding/damage to croplands, financial burdens; Hammond et al., 2013)

-Increased prevalence of anxiety, depression, suicide among farmers in rural Australia (Ellis & Albrecht, 2017)

Climate Change and Human Wellbeing:

-Human wellbeing directly correlated with health of natural resources; state of wellbeing plays vital role in health & management of natural resources (Biedenweg et al., 2014)

-Top wellbeing indicators across Puget Sound: exercise, access to safe local food, access to safe drinking water, access to communication, stewardship, positive emotions, traditional resource practices, trust, cultural events, strong families/relationships, community supportive job sector, & industry (Biedenweg et al., 2014)

-Anxiety of future climate change affects; mental health repercussions from increased natural weather events (and impacts to mental health systems); current effects of climate change disturbances on low-income populations due to economic/social/environmental factors (Fritze et al., 2008)

-Some demographics more negatively affected: women, rural (natural resource industry) low-income, ethnic minorities, Indigenous communities, children (Manning & Clayton, 2018; Fritze et al., 2008)

-Low-income communities: high economic dependence on climate-driven economies (e.g., agriculture, power generation, tourism); lack of access to resources; limited infrastructure (Fritze et al., 2008)

-Climate change impacts: reduced income/loss of jobs, damage to assets from extreme weather events or forced relocations (esp. in rural/coastal regions), increased costs of general goods & services due to food supply disruptions (Fritze et al., 2008)

-Projected concerns (coastal Oregon): increased shellfish poisoning, limited access to fish/crab harvest, surging tourism/increased retirement rates, declining natural resources, economic damages due to changing environmental conditions, economic/recreational changes due to resource availability (Hoelting et al., 2017)

-Concerns vary by profession/personal expertise (e.g., fisherman more concerned with fish stocks/algae blooms than laymen; Hoelting et al., 2017)

-culturally significant natural resources influence concerns (Hoelting et al., 2017)

-Trauma from life disruptions/natural disasters- 7-40% of those impacted experience mental changes/disorders (Manning & Clayton, 2018)

-Rising temperatures associated with declining school performance, increased suicide rates (Manning & Clayton, 2018)

-Increased droughts affect food supplies and thus mental health (Manning & Clayton, 2018)

-Forced migrations increase emotional discomforts, loss of power (Manning & Clayton, 2018); increased depression/anxiety, violence, suicide resulting from increased exposure to domestic abuse, unstable/loss of houses, lack of access to support/resources (Fritze et al., 2008)

-Changes to local environments create sense of loss/changes to sense of place (Manning & Clayton, 2018)

Encompassing Themes:

-Climate change will result in both physical and mental changes for humans

-Human wellbeing is directly connected with physical, social, financial, and environmental factors

-Climate change will result in dramatic changes to peoples occupational and financial situations, physical health, social resources, and natural environments

-Communities (rural, coastal, indigenous, low-income) that are highly dependent on natural resources will feel direct impacts of climate change

Implications for Policy/Management:

-Incorporate wellbeing indicators into policy/decision-making to create more effective monitoring of natural resources (Biedenweg et al., 2014)

-Regulations & policies fail to recognize changing physical/economic conditions of agricultural sector; should support adaptive/innovative practices to promote self-sustaining farms and reduce risks to vulnerability to economic/environmental changes; increase educational opportunities and public awareness of natural resource sectors (Hammond et al., 2013)

-Socioeconomic incentives for ecosystem recovery (Bottom et al., 2009)

-Increased efforts at local levels to address mental and holistic health of communities (policy, public awareness, enhanced communication, mental health infrastructure; Fritze et al., 2008)

-Inclusion of Indigenous cultural and social values in decision-making process; inclusive of diverse viewpoints and values (Donatuto et al., 2014; Montag et al., 2014)

-Increased collaboration across multiple jurisdictions (Montag et al., 2014)

Limitations/Knowledge Gaps:

-General lack of local data (Salish Sea) on social science regarding climate change, but plentiful local data on natural science data

-Limited information on local rural vs. urban population effects from climate change (very lacking in human dimensions research on fisheries and climate change)

-Lack of comprehensive demographic information/data on diverse cultural values/concerns

-Lacking resources of literature on human wellbeing/social science and food webs

Suggested Future Research:

-Local social surveys on concerns/vulnerabilities/adaptive capacities of different communities/demographics regarding climate change effects

-Further in-depth research on rural vs. urban climate change responses/effects in Puget Sound (e.g., natural resource industry impacts, specifically fisheries)

-Increased research on human connectivity to food webs (with regards to human wellbeing versus physical science)