Name:

GEOG 300

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CT#1 due 9/17/2017, question 1

Word Count: 506 (not including citations; including section titles)

**Dam Removal for a Sustainable Future**

***Interpretation (98 words)***

There are 84,000 dams in the United States which currently impound approximately 600,000 miles or 17% of American rivers (Ansar et al., 2014, pg 2). The stated purpose of many of these dams is to provide infrastructure for irrigation, flood control, and inexpensive hydroelectric energy, however, they also negatively affect fisheries, while fundamentally changing the geomorphology of rivers, and contributing to loss of biological diversity at large. While these dams, if retrofitted with modern technologies, could provide several useful functions for humans, the benefits of removing obsolete and outdated dams far outweighs the costs of keeping them.

***Analyses (299 words)***

For thousands of years humans have lived along river systems and depended on these rivers for food in the form of fish. Dams disrupt fish habitat by creating barriers to fish passage and by changing the geomorphology of the rivers to which these fish are adapted (Bednarek et al., 2007, pg 10). They create slack waters that are difficult for smolts to pass through, hold sediment in their reservoirs, and lower water tables below the dam sites (Magilligan, 2016, pg 158). This process in turn incises rivers and produces warm and turbid waters while disconnecting streams from their flood plains and riparian habitats. Water geo-chemistry becomes altered, and once well-connected habitats are fractured. The result: an environment toxic for fish adapted to cold, clear, flowing waters, once joined from the mountains to the ocean.

Beyond the major disruption to fish habitat, the geomorphological changes that dams produce have overarching systems effects on the biological diversity in these ecosystems (Yoshioka et al., 2014). To be put simply, bio-diversity is sustainability. It is through access to the vast array of biological life on this planet that people derive the crops they grow, the foods they eat, and the medicines they use to heal themselves. It is this basis upon which ecosystems are built. However, when rivers become incised due to lowered water, and are disconnected from their floodplains, wet meadows dry up, estuaries diminish, and nutrients once flowing freely in these transition zones dissipate with the evaporating water. Once diverse ecological communities become breeding grounds for foreign weeds like blackberry and arundo. The effect on biological diversity is devastating. River, riparian, wetland, and estuarine habitat are some of the most productive and diverse systems on earth. They are not worth sacrificing for marginally functional dams.

***Evaluation (43 words)***

Bednarek only used a number of case studies when quantifying the extent to which dam removal increases biological diversity in river and riparian ecosystems. Similarly Magilligan et al used a singular case study to examine how dam removal changes the geomorphology of rivers.

***Inference (39 words)***

On a global scale dams negatively affect access to sustainable natural resources by posing a direct threat to fish habitat, and negatively effecting biological diversity through disruption of habitat and change to the geomorphology of river systems.

***Explanation (60 words)***

The benefits of removing a vast number of dams that provide little benefit in terms of flood control, irrigation, and hydroelectric power, and are obsolete and outdated, far outweigh the benefits of keeping these structures. When rivers can run, and in doing so return to stable states, the benefits in terms of sustainable fisheries, water resources, and biologically diverse ecosystems are insurmountable.

***Sources (4 sources 2007-2017)***

Ansar, A., Flyvbjerg, B., Budzier, A., & Lunn, D. (2014). Should we build more large dams? The actual costs of hydropower megaproject development. *Energy Policy*, *69*, 43-56.

Bednarek, A. T. (2007). Undamming Rivers: A Review of the Ecological Impacts of Dam Removal. *Environmental Management*, *27*(6), 803–814. https://doi.org/10.1007/s002670010189

Magilligan, F. J., Nislow, K. H., Kynard, B. E., & Hackman, A. M. (2016). Immediate changes in stream channel geomorphology, aquatic habitat, and fish assemblages following dam removal in a small upland catchment. *Geomorphology*, *252*, 158–170. https://doi.org/10.1016/j.geomorph.2015.07.027

Yoshioka, A., Miyazaki, Y., Sekizaki, Y., Suda, S., Kadoya, T., & Washitani, I. (2014). A “lost biodiversity” approach to revealing major anthropogenic threats to regional freshwater ecosystems. *Ecological Indicators*, *36*(Supplement C), 348–355. https://doi.org/10.1016/j.ecolind.2013.08.008

**Critical Thinking Paper Grading for CT # 1:**

***Logistics (20%) Content (55%)***

Question #; Your Name; 10% Interpretation\_\_\_\_

Your ID #; TA Name; 25% Analysis\_\_\_\_\_\_\_\_\_