



Nature–society linkages in the Aral Sea region

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ABSTRACT

Central Asia's Aral Sea crisis represents a disaster of monumental proportions, a tragedy for both the region's ecology and its human inhabitants. While the human and natural environments had operated in a sustainable co-joined system for millennia, Tsarist Russian expansion into Central Asia, followed by Soviet expansion of both the cotton industry and unsustainable irrigation practices to anchor it spelled doom for the Aral Sea. Today, many of the political and economic stimuli for such misguided practices continue, as do the continued retreat of the Sea and the proliferation of poor human health. The Aral Sea crisis has received ample scholarly attention, though somewhat surprising is a relative dearth of research explicitly investigating the nature, variety, and directionality of nature–society linkages today within the region. The purpose of this paper is to elucidate the contemporary nature–society linkages operating within the Aral Sea region of Central Asia. Historical nexuses will provide necessary background, and the linkages operating currently within the spheres of regional economy, human health, and political considerations will be detailed. Couching the current crisis within the framework of coupled human–environment system contexts reveals a region in which these linkages are largely inextricable. This paper concludes with a call for a reconsideration of the nature–society linkages and a greater emphasis placed on the local region's ecological and social sustainability.

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The Aral Sea tragedy provides the most striking example of the interconnections between the health of an ecosystem and that of the economy, community, and people dependent on that ecosystem. (Postel, 2000, p. 943)

1. Introduction

The Aral Sea, straddling the border separating western Kazakhstan and northwestern Uzbekistan, needs little by way of introduction. Once the world's fourth-largest inland water body, the Aral today is a shriveled, fragmented series of no fewer than six distinct water bodies dotting a desiccated landscape. These remains represent a monumental disaster, the scope and scale of which have few parallels in human history. The largely anthropogenic origin of this disaster has been well chronicled within a broad array of literature (Bissell, 2003; Feshbach & Friendly, 1992; Glantz, 1999; Micklin, 1988; Spoor, 1998). Receiving somewhat less attention has been the important, though admittedly much smaller, influence played by the region's arid climatic environment, sparse precipitation, and high summer

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temperatures (see Micklin, 1988 or Lipovsky, 1995 for such a treatment). The purpose of this paper is to couch the Aral Sea disaster and its contemporary political, economic, and human health manifestations within the multidisciplinary framework of the interrelationship between humans and the natural environment. This analytical framework, referred to here as nature–society linkages, forms an academic pillar within the discipline of geography, as well as political, landscape, and human ecology, sustainability science, and coupled human and natural systems (CHANS). Over the past five decades, this paradigm has evolved from a recognition of the bidirectional relationship between two linked though distinct entities (see e.g. Pattison, 1964), to a treatment of a symbiotic, coupled human–environment system (e.g. Turner et al., 2003). Given the exhaustive examination of the Aral Sea crisis and the ascendancy of the analysis of nature–society relationships, the relative paucity of academic literature explicitly joining these themes is surprising. This paper seeks to fill that scholarly void.

What follows begins with a brief overview of the Aral Sea region, followed by a historical account of this region highlighting the interaction between the regional human populations and the natural physical environment. Contemporary nature–society links, compartmentalized within economic concerns, human health issues, and political considerations, are next discussed, followed by a treatment of linkages operating between these three dimensions. An analysis of the multitude of links will demonstrate the inextricable nature of these connections, and that indeed, what exists here is a tightly co-joined coupled human–environment system. The connections within this system have not been fully appreciated, and today continue to be neglected. This paper will argue that policy prescriptions aimed at improving the overall situation in the Aral Sea region must recognize and consider these interdependencies. Nothing less than the region's environmental and social sustainability is at stake.

2. The region

The Aral Sea, in reality a landlocked terminal lake with no outflow (Micklin, 1988), is located within the arid environs of Central Asia (Fig. 1). The immediate region anchors an eye-shaped expanse of midlatitude desert (Koppén classification BWk), formed primarily by the Qizl Qum (red sand) and Kara Kum (black sand) deserts. Ringing Central Asia's desert environment are swaths of midlatitude steppe (Koppén's BSk) to the north and east, and subtropical steppe (BSh) to the south and east. Far to the Aral's east and southeast are situated the great orographic masses (Koppén's H) forming the headwaters of Central Asia's major river systems, the Syr Darya and Amu Darya. These rivers together account for the only inflow (surface precipitation and groundwater contributions are minimal) of water to the Aral Sea. The Syr Darya (Jaxartes of antiquity) originates in the Tien Shan mountains of easternmost Kyrgyzstan near the Kyrgyz–Chinese border. Flowing west across Kyrgyzstan, the Naryn and Kara Darya join in Uzbekistan's densely populated Ferghana Valley, forming the main Syr Darya that continues across northernmost

Tajikistan reentering Uzbekistan and flowing northwest through Kazakhstan, emptying into the Aral Sea. Referring to the Aral Sea as a single contiguous entity, however, is a misnomer. By the late 1980s, the receding Aral had split into the "Little" Aral to the north and "Big" Aral to the south (see e.g. Micklin, 2006). Today, the Syr Darya empties into the "Little" Aral situated entirely within Kazakhstan's Kyzlorda *oblast*.

The Amu Darya (famed Oxus of antiquity) originates in easternmost Afghanistan in the peaks of the Hindu Kush. Flowing generally westward, the great river forms much of the boundary between Afghanistan and Tajikistan, the entire Afghan–Uzbek border, and part of the Turkmenistan–Afghanistan border before turning northwest through eastern Turkmenistan, into the Uzbek autonomous republic of Karakalpakstan, and expiring in the desert near where it once fed the Aral Sea from the south. Worthy of note here is the lengthy Kara Kum canal, a man made irrigation ditch flowing northwest through most of Turkmenistan. This canal was conceived during the early Soviet period as part of a regional irrigation scheme referred to by Grigoryev (1952) as "the Stalin plan for remodeling nature" (p. 170).

Regional analysis of the Aral Sea is fraught with a number of issues. The most natural region would perhaps be the Aral Sea drainage basin, including the Aral itself and the drainage basins of its feeder river systems, the Amu Darya and Syr Darya. Today this natural region is politically fragmented, including portions outside of Central Asia (China, Afghanistan, and Iran) as well as Tajikistan, Kyrgyzstan, Uzbekistan, Turkmenistan, and southern Kazakhstan. The resulting discontinuity between the superimposed political boundaries (human artifacts) and the Aral Sea basin (natural environmental region) forms a fundamental foundation for any analysis of contemporary nature–society links within the region. What remains of the Aral Sea is today shared by Kazakhstan and Uzbekistan. The immediate region, including the deltas of the Syr Darya and Amu Darya, is located within Kazakhstan's Kyzlorda *oblast*, Turkmenistan's Dashaguz *oblast*, and the Karakalpakstan autonomous republic within Uzbekistan. These three sub national geographical units, closest to the Aral itself, have suffered the brunt of the ecological and socio-economic consequences of the sea's retreat (Feshbach & Friendly, 1992; Micklin, 2006). As a result, this paper's focus will primarily be on this localized region, the contemporary interactions between its inhabitants and the natural environment surrounding the Aral Sea itself. Some fluidity in regional treatment is necessary, however, particularly in examining historical developments in the wider region of Central Asia, as well as the modern disputes and cooperation between states in the Aral Sea drainage basin.

3. Historical nexuses

3.1. Early period

Human beings and the Aral Sea region's natural environment have operated in an interrelated system for millennia. The region's physical landscape is singularly marked by its aridity, dominated by two large deserts (the

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