Journal of Great Lakes Research 41 Supplement 1 (2015) 8–11

Contents lists available at ScienceDirect

Journal of Great Lakes Research

journal homepage: www.elsevier.com/locate/jglr

Commentary

Towards a balance between responsibilities and rights to the ecosystemic goods and services of our Great Lakes — St. Lawrence River basin

H.A. Regier[a,*], J.R. Coon[b], J.A. Jackson[c]

[a] University of Toronto, 563 Spadina Cres., Toronto, ON M5S 2J7, Canada
[b] University of New Hampshire, 105 Main St., Durham, NH 03824, USA
[c] 17 Major Street, Kitchener, ON N2H 4R1, Canada

ARTICLE INFO

Article history:
Received 14 February 2014
Accepted 16 June 2014
Available online 8 November 2014

Communicated by Irena Creed

Keywords:
Governance
Ecosystem goods and services
Great Laurentian Spring

Our Great Lakes — St. Lawrence River basin, or Great Lakes basin for short, extends from countless headwater streams through a vast river with numerous enlargements (i.e., lakes) to where it flows into the saline waters of the Gulf of St. Lawrence downstream from Quebec City. There may be few other large basins in the world with as large and diverse a network of environmental experts as in this basin during the past hundred years. Yet abuses have been common and deplorable consequences of human activities in our basin, such as burning rivers, have attracted global attention. In the following narrative we explore a deep cultural reason for the continuing debasement of our basin's ecosystem in spite of a partially successful basin-wide campaign in the recent past to remediate numerous abuses.

Superficially the following account may appear to be a linear narrative. We intend it to be like a montage of brief accounts of complex historical events or self-organizing episodes that we string together loosely to produce a non-linear perspective overall. Each of the three authors has decades-long professional experience with more than one major aspect of our basin's dynamic network of complexities and episodic happenings; together our person-years of professional experience total about 120. From that perspective, this commentary has an empirical base and makes no claim for high theoretical and scholastic qualities. Its purpose is to stimulate informed cross-generational dialog by practically oriented ecosystem stewards, with inevitable differences of many kinds among those engaged in the Great Lakes Futures Project and beyond.

A thousand years ago several alliances of Aboriginal Peoples shared the lands and waters of our Great Lakes basin. Aboriginal Peoples, notably Anishinaabe and Haudenosaunee in our basin, created complex cultures through millennia of evolutionary processes (Riley, 2013) in which interpersonal sharing rather than private property rights dominated. Sandy lands with prairie-like biota were preferred for large settlements; Aboriginals' skill with grass fires helped to arrest ecological successional processes. Spring-fed streams had fish especially at spawning season. Self-governance processes related to periodic translocations of a settlement; interrelationships among networks of local settlements; intertribal alliances and long distance trade. Their home building, agriculture, fishing, hunting, commerce and conflicts did not leave deep permanent scars on the natural features of their ecosystems. Periodic natural rewilding of locales was part of centuries long spatially shifting cultural processes in the basin landscape.

Extant Aboriginal cultures began to crumble disastrously following the invasion of only a few Europeans (military, clergy, trappers) five centuries ago. Outbreaks of European diseases brought horrible deaths to most of the Aboriginals infected. Demand for luxurious furs by wealthy Europeans led to disruption of the natural ecology and native economy, and many Aboriginals found no appropriate substitute for their traditional lifestyle. When many Europeans settled in our basin starting some two centuries after the first contacts, the landscape had already undergone partial rewilding as a result of the disease and cultural disruptions that greatly reduced the number of Aboriginals (Riley, 2013).

The Europeans' laws encouraged settlers to possess and use private property intensely, within a regime in which the rights that came with private property were specified by elected governments, with royal assent in earlier times. Through coercive negotiations and military action, Aboriginals that survived exotic epidemics were confined progressively to ever smaller reserves on which aspects of their ancestral cultures were constricted if not extinguished. In French Canada, intermarriage between Aboriginals and Europeans was more common than elsewhere. Some lands and waters were 'cleansed' of Aboriginals by slaughter of all village residents and expulsion to distant territories.

Varieties of the European legal system, as they came to be applied in our basin, were poorly suited to the structures and dynamics of our basin's natural ecosystems. For example, Europeans demarcated the boundaries of property, whether held by private individuals or by

* Corresponding author at: 10 Ernst Street, Elmira, ON, N3B 1K5, Canada. Tel.: +1 519 669 5552.
E-mail address: hregier@rogers.com (H.A. Regier).

http://dx.doi.org/10.1016/j.jglr.2014.10.003

some level of government, with straight lines, usually. Physical barriers of some kind were often imposed along boundary lines. Our basin ecosystems as they self-organized naturally did not come to manifest straight lines with respect to the spatial limit of any ecosystemic feature. So a straight line border of some person's or jurisdiction's property was always an unnatural feature and, in practice, inevitably interfered with the structure and dynamics of a natural ecosystem through which such a boundary was put into practice physically. Generally, the larger the natural species, the more such a legal regime acted to its disadvantage.

An ecosystem contains solids, liquids and gases, and a wide variety of mixtures and solutions of these three phases. The boundaries that Europeans imposed on a landscape made some practical sense with respect to immobile solids, within that mindset. The boundaries made less sense with vagile creatures, even less with mobile liquids and hardly any sense with fugitive gases.

Private property and jurisdictional property boundaries were located near the middle of a stream or lake in some parts of the basin. Of course, the water and its biota had no way of sensing the border. Nowhere in our basin was the height of land between adjoining sub-basins denoted as a jurisdictional boundary.

The European settlers and their descendants developed conventions of varying formality in which the specified privileges that came with the individual rights of private property were to be balanced with responsibilities to exercise those rights in ways so that the privileges of other nearby owners were not to be impaired by the inevitable 'spill-over effects'. It never really worked that way in practice, anywhere in our Great Lakes basin, over the past three centuries. Elected governments in our nested democracies with their bureaucratic servants did not take the necessary ownership relevant responsibilities seriously enough.

Disparities between the benefits that came with a strong emphasis on rights and the disbenefits that came with a weak emphasis on responsibilities became apparent in our basin in the mid-19th Century. One kind of failure of governance in all larger settlements related to sewage-born illness (e.g., typhoid fever, cholera and diarrhea) that resulted when persons downstream of a community (that voided its wastes into a nearby water body) used contaminated water for drinking and household purposes.

Agriculture and forestry upstream in tributary basins contributed to the extinction of Atlantic salmon in Lake Ontario. In many locales sawdust was dumped into streams where it covered the bottom of streams and decomposed only slowly over many decades. A small lake along the Otonabee River in Peterborough, Ontario was nearly filled with sawdust. Dams to power primitive agricultural and lumber mills were built in streams, which interfered with fish passage to upstream spawning habitat even where primitive, bypass fish ways were constructed. Farmers cultivated soil near stream banks and pastured livestock along unfenced stream courses resulting in much erosion. Clear streams became turbid; sediment was deposited on gravel beds where developing eggs of Atlantic salmon and other species suffocated. Also, manure in streams and sewage from towns resulted in the fertilization of nearshore waters of Lake Ontario contributing to greater pelagic algal production.

When a fish culturist then accidentally introduced the small, fecund, flat herring called alewife into the lake in about 1870 there were few pelagic predators like Atlantic salmon left to prey on them. The alewife population fed on the plankton of enriched nearshore waters and exploded in number. Masses of dead alewife washed up on beaches in late spring where they were not welcomed. Thousands of farming and lumbering acts by settlers near the banks of streams and rivers contributed to the extinction of Atlantic salmon and the explosion of alewife in Lake Ontario. So human activities in upstream jurisdictions can lead to the emergence of complex problems in downstream jurisdictions if responsibilities are underemphasized.

To try to resolve crises like this, persons in authority cobbled together groups of well-informed and well-intentioned representatives to meet, discuss and agree through consensus on some corrective measures that could then be endorsed and funded (or not) by the elected governments with a stake in an issue. Often such ad hoc groups were called commissions or committees because the participants had been sent or committed or delegated by the authoritative elected bodies. Other terms have also been used such as authority, board and organization. It was generally intended that appointed commissioners have less legalistic power than elected administrators.

Starting in the late 19th Century in our basin, appointed cross-jurisdictional commissions, generally with few staff, have gradually proliferated so that they now exist as a kind of flexible parallel mesh to the more formally organized and nested networks of elected government with its intricately constructed bureaucracy of many specialized civil servants. In general, commissions with their flexibility help to govern features of our basin ecosystem that formal governments with their rigidity and biases fail to accomplish on their own. In particular, appointed commissions often provide support for the role of responsibilities to balance the role of rights to which elected governments are more attuned.

Back in the mid-19th Century, state and provincial governments in our basin, with federal governmental assistance, helped to found and fund universities. Early scientific subjects were relevant to various features of our basin ecosystem, we note in retrospect. Professors collaborated with government researchers and administrators, especially at the federal level, to provide useful information. Geologists, meteorologists, mappers, hydrographers, biological taxonomists and fisheries biologists, for example, interacted across jurisdictional borders and published ever more information relevant to major features of our basin ecosystem.

In 1870 fisheries scientists in various Great Lakes region jurisdictions joined with peers across our continent to create the American Fisheries Society. It provided an annual forum and printed proceedings that contributed to the emergence of a regional basin network nested within the continental network. Perhaps more than with any other scientific field, fishers, commercial enterprises, fishery researchers, sport-fishing organizations, managers, administrators and politicians have networked collaboratively in the Great Lakes basin over nearly a century and a half.

Jumping ahead, in the mid-20th Century Americans with Canadian collaborators began to convene annual scientific meetings that were interdisciplinary with respect to aquatic features of our basin. Over the decades, this initiative has evolved into the transdisciplinary International Association of Great Lakes Research that now extends to Great Lakes regions elsewhere in the Biosphere. The International Association of Great Lakes Research convenes highly interactive annual meetings and reaches many more experts with its highly reputed scientific journal.

By 1950 the ecological concept of an ecosystem was current in our basin's universities. Here we use the term 'Great Lakes basin ecosystem' in a broad sense, to include the activities of all living creatures, including humans, and their influences on ecosystem structures and dynamics. Geographically we include all the lands from which tributaries drain into this vast Laurentian River with each lake as an enlargement of a stream, river, and the mainstream of the Laurentian River. We see Lake Erie, for example, as a three-compartment widening of the mainstream Laurentian River; the currents within the sequence of basins in Lake Erie cohere structurally and dynamically with currents flowing into Lake Erie and currents flowing out of Lake Erie. The downstream boundary of this vast riverine ecosystem for us is where the freshwater spills into the saline Gulf of St. Lawrence northeast of Quebec City.

In the 1960s thousands of people in our Great Lakes basin became deeply concerned about the degradation of local and regional environments and the dangers for humans that such degradation entrained. Burning rivers, foul beaches, suffocating smog, dying Lake Erie, disappearing eagle and fisheries-destroying sea lamprey triggered attention. Non-governmental organizations emerged to combat these ills and coalesced into a number of federations; many eventually joined in the basin-wide Great Lakes United. For four decades, Great Lakes