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In RE: Town of Washington, NRI

This analysis has been prepared at the request of the Town of Washington's Conservation Advisory Commission and is designed as a preparatory document for a discussion I will be leading for the Conservation Advisory Commission (and other stakeholders) via Zoom on the evening of December 7th.

The NRI traditionally has been a cataloging, mapping, and narrative description of a town's natural resources. It is a descriptive document that contains maps and illustrations. I prepared the Town of Ridgefield (CT) NRI and at its time it was a good model of what a more expansive NRI can look like. It would be useful to examine this NRI but also NRIs from other jurisdictions especially those in the Hudson Valley. However, the NRI of the future in my opinion needs to go even further. It cannot be simply a catalog of flora and fauna, with maps of geology and wetlands, and other habitat types, but it can provide a framework from which public policy decisions are made. It should provide strategies on how to ensure that the rich diversity of natural resources within the Town of Washington are maintained as well as buffered from the effects of inappropriate development and climate change. In short, this NRI ideally should be able to bridge the gap between the natural world and the dynamics of climate change and intensifying land uses, providing a logical pathway leading to actions to conserve the natural resources of the Town of Washington.

Washington's landscape is dynamic and in a constant state of change. Its uniqueness is the result of the interplay between two very important factors. The first is the Town of Washington's biogeographic position (biogeography is the study of the landscape arrangement of plants and animals on a regional scale) and the second is anthropogenic (human-created) landscape changes that have occurred over time. Taken in tandem, these two factors have created the Town of Washington's exceptionally rich diversity of natural resources.

Biogeographic: Washington's position in the central valley of Dutchess County is at or near the northern range edge limit of a guild of species with more southerly distributions. With a warming climate, one can anticipate that certain species will expand their range northward. It can be argued that the gene pools of range edge species are best genetically equipped (= adapted) to expand their ranges northward. A good example is the eastern box turtle, a species that occurs in small, low density populations in this part of Dutchess County. Box turtle populations at their northern range edge have genetic adaptations that have evolved as a result of the unique ecological stresses imposed on survival at their range edge. Box turtle populations at their northern range limit are smaller in number of individuals and those individuals average considerably larger in body mass than those found on Long Island and farther south. I would suggest the PERIPHERAL AND RANGE EDGE SPECIES receive special attention in the NRI as part of the overall discussion of flora and fauna.

It is well understood that with climate change species will have to disperse in different ways across the landscape. An un-fragmented landscape (one that is relatively free of impediments to the dispersal of plants and animals) is a resilient landscape. Washington has a considerable amount of un-fragmented habitat, but where are there critical constriction points? While plants and animals disperse across the landscape in various patterns there are often "choke points" caused by existing development or natural

features such as narrow valleys between ridges. Can such areas be identified in the Town of Washington? Can these potential impacts be mitigated? (A good example of choke points/constrictions is contained in the Eastern Westchester Biotic Corridor in the MCA publications section of www.michaelwklemens.com). Are there other obstacles to species migration? Are there DISPERSAL AND CONNECTION CORRIDORS that require special attention? What types of RESILIENCY MITIGATION are needed in stream corridors so they effectively disperse wildlife? Something as simple as replacing circular under-the-road culverts with oversized square box culverts is an important resiliency strategy. Stream and rivers are major dispersal pathways for wildlife. Are culverts sized correctly for increased rainfall frequency and volume that result from increasingly violent storm events caused by climate change? Elevation gradient migration will also occur with species relocating up mountainsides from lowlands as temperatures change. Protection of an elevation continuum is another resiliency strategy

Anthropogenic: The patterns of land use in the Town of Washington are quite unique. Large estates and landholdings have preserved significant portions of the landscape with greatly reduced fragmentation. This has resulted in a rich diversity of species that require intact landscapes of 1000 acres or more. This is changing. While change has relatively been slow since the 1930s, the pressures of development and accompanying fragmentation pose a significant challenge now and into the future. Many of the most important habitats such as grasslands (in large part preserved through agriculture) are declining and with that loss many regionally rare and uncommon species. Other valuable habitat types that go unrecognized are sandy, gravelly, and scarified areas, many of anthropogenic origin, including abandoned sand and gravel mines. These areas, as well as areas of glacial outwash, serve as critical habitat for a guild of species that are very scarce. These species include plants, invertebrates, and reptiles. I would suggest that CHANGING PATTERNS OF LAND USE be an integral chapter in the NRI.

BEDROCK AND SURFICIAL GEOLOGY both are important components of an NRI, to be both mapped and discussed. Under this discussion should be discussion of AGRICULTURAL SOILS and their locations in the Town.

HABITAT TYPES as defined on the Hudsonia Map should be incorporated into a discussion. Which habitats are common, which rare, and what strategies will be needed to maintain the rich mix of uplands and wetlands? Policy questions would be whether Town of Washington's wetlands regulations are sufficiently protective or should they be reviewed especially in the climate change scenario we are in.

The Town of Washington has a very rich diversity of WETLANDS ranging from small but critically productive vernal pools, calcareous fens, marshes, and swamps. WATERCOURSES transect the Town. Lakes, ponds, and reservoirs are often the product of human actions. Many of these are generalized wetlands which have much less biological value, but serve other functions such as flood control, and are appealing to the human eye. The creation of these lakes, ponds, and reservoirs often occurs at the expense of (flooding or digging out) of more structurally complex and ecologically important wetland types. In some instances, areas that are considered wastelands, but are in fact ecologically productive dry land habitats, are flooded for ponds and lakes. Many of these created wetlands serve as ideal habitat for a guild of species that flourish in the presence of humans (e.g., Canada geese, painted turtles, and bullfrogs) at the expense of other rarer species that require more structurally complex habitats (e.g., wood ducks, spotted turtles, pickerel frogs). A possible area of inquiry would be to investigate the conversion of wetlands and map wetlands that are largely natural, versus those that are primarily human created.

One significant point of current confusion is the relationship between uplands and watercourses and water bodies. There are several ways to manage regulation and conservation of land adjacent to wetlands. BUFFERS are areas that are left intact and undisturbed as a natural filtration and protection of wetlands and watercourses. Buffers serve a myriad of functions including protecting water quality and temperature, reducing flashiness (a major concern with climate change) and providing habitat and dispersal routes for wildlife. UPLAND REVIEW AREAS are a proscribed area around a wetland and watercourses where development and other types of land uses are evaluated as to their potential to adversely impact receiving waters. These are two very different concepts that have been conflated (i.e., used interchangeably) in the Town of Washington's wetland regulations which have important resiliency implications. See the following taken directly from the Town of Washington's regulations:

Controlled Area: An area surrounding a wetland or watercourse, also known as a buffer or regulated setback, that is also subject to the regulations of this code, determined as follows, all measurements to be taken on the horizontal plane: 1. For all wetlands, the "controlled area" shall be: a. For a wetland that is one (1) acre or greater in size the land area within one hundred feet (100') of the boundary of the wetland. b. For a wetland that is less than one (1) acre and greater than ¼ acre in size the land area within fifty (50") feet of the boundary of the wetland. 2. For a perennial watercourse or waterbody the "controlled area" shall be the land area within one hundred (100) feet from the top of the bank of the watercourse or waterbody. The top of bank shall be the mean high water mark of the water course or water body. For an intermittent watercourse, the "controlled area" shall be the land area within fifty (50) feet from the top of the bank of the identified channel.

Why this should be of concern to the development of an NRI is that an NRI should identify where BUFFERS (undeveloped areas) along wetlands and watercourses exist and designate those as protected areas. My reading of the definition above indicates that there are actually no designated areas around wetlands and watercourses that are protected, rather all land adjacent to these resources may be subject to some form of use, predicated upon review by relevant Town of Washington agencies. If the desire is to be a Climate Smart Community, resilient from the effects of alternating patterns of rain and drought that characterize climate change, serious consideration should be given to mapping proposed/desired buffers as part of the NRI. Buffers are an ecological construct, upland review areas (controlled areas) are a regulatory land use construct. They are very different.

FLOOD PLAINS AND FLOODWAYS are increasingly critical in any resiliency strategy. Mapping of these with the most up-to-date data should occur. Many infrastructure projects now use the 500-year flood-line as the precautionary standard. One interface between Climate Smart Communicates and the NRI might be the mapping of the Town superimposed on the 500-year flood-line and examining how much critical infrastructure is at risk and how it can be hardened.

EXOTIC INVASIVE AND OVER ABUNDENT NATIVE SPECIES are another area that public education through the NRI is important. I use the term SUBSIDIZED SPECIES as an overarching term to encompass these species. Why? Because every one of these species that we consider problematic (e.g., bittersweet, garlic mustard, white tail deer) have one thing in common—they are here because of us. Rather than label species as good or bad, I prefer trying to understand why they are here, and shift the "blame" to where it belongs, from the species, to the cause of their presence or abundance, a result of choices we

have made over centuries concerning land use. Wholesale removal of subsidized species can have adverse ecological impacts. Many species such as birds and reptiles are structuralists. These species use thickets of multi-flora rose (exotic) or bayberry (native) for cover without differentiation.

HISTORICAL FEATURES are included in some NRIs and not others. I have no strong opinion either way about including within your NRI a section describing historical structures and other features such as stone walls. However, historical patterns of land use are, from my perspective, the critical part of any historical analyses, as they directly affect species composition past, present, and future. For example, grazing and haying of land are often surrogates for lost ecological processes such as fire. It can be argued that these land uses are vitally important to maintaining open (early successional stage) habitats. The endangered bog turtle is a good example. Almost every population of this species occurring in the Hudson Valley, including those in the Town of Washington, are found in habitats that have been maintained as open canopy wetlands by agricultural practices. A good resource for the interface between agriculture and biodiversity is the Glynwood Center in Cold Spring, NY.

ENERGY RESOURCES. This is a new concept, but one that could inter-play with Climate Smart Communities. As the concept of green energy is the reduction of carbon and fossil fuels (conservation of natural resources), some mapping and discussion of these approaches could be valuable. Can you analyze the number of houses with solar power or geo-thermal? Can you suggest future locations for more solar fields? Are there charging stations for electric cars, and if not, where could they be? What types of incentives can be provided by the Town to encourage more green energy use?

TOW and VILLAGE OF MILLBROOK. Ideally, you will be able to work on a joint NRI. This makes sense in so many ways. The Village has the density offset from the more rural areas. The Village may have extensive infrastructure at risk from climate change. And it may be one logical place to have charging stations for cars. I encountered a similar situation in the Village and Town of Warwick in Orange County, NY. (see Lower Walkill Biodiversity study in the MCA publications section of my website www.michaelwklemens.com). One cannot study the resource infrastructure of the Town of Washington without considering the imbedded village area. It may also be helpful to identify shared critical resources with adjacent towns. Examining inter-municipal approaches to resource conservation has resulted in a series of publications of the Metropolitan Conservation Alliance (see MCA on my website www.michaelwklemens.com). This built on the concept of inter-municipal land use leadership that was an integral part of Pace's Land Use Leadership Alliance.

I have spent considerable time outlining components of what can be done in an NRI. This is not an exhaustive list but a starting point to guide your thinking. What the Conservation Advisory Commission needs to do is identify the sources of information publically available including GIS layers and aerial photography. Also determine the agencies, institutions, and individuals that may be of assistance in developing this NRI. Understanding what data exist and what data gaps need to be filled by field research is a crucial step. Within the Town of Washington are several institutions that should be able to offer technical assistance, Cornell and IES. Dutchess County and the NY DEC are other resources. One cautionary note, when selecting the consultant (s) who is (are) going to work through this process with you, look for those that have a demonstrated competency in this work. If a firm is primarily one that works with developers, they may be hampered with a pro-development approach. Unlike a regulatory agency such as the Planning Board, the Conservation Advisory Commission is not charged with balancing the environment with development, rather it serves as reporter of what the natural world requires to survive, and is an unabashed advocate for those resources. That should be your overarching focus on the NRI.