

Economic Value of the Nanticoke River Watershed in Delaware and Maryland

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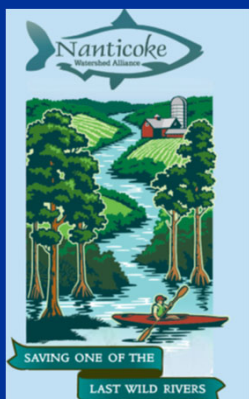
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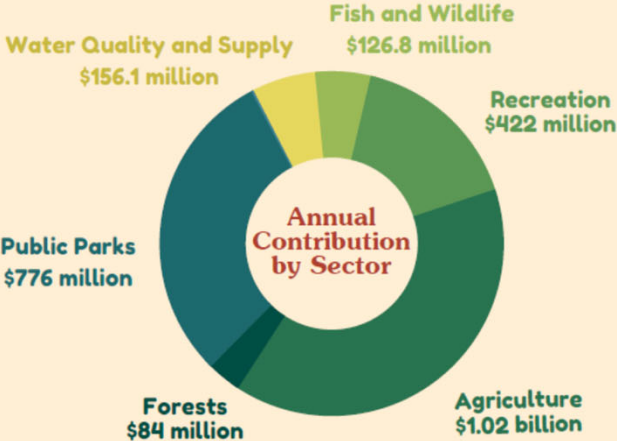
Economic Value of the Nanticoke Watershed



Prepared for
**Nanticoke
Watershed Alliance**

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Annual Contributions to Local Economies



The Nanticoke Watershed

- 1,000 years ago, the Nanticoke people lived along the “people of the tidewaters.”
- In 1608, Captain John Smith mapped the Nanticoke encountering 200 warriors.
- The Nanticoke is Delaware’s largest watershed
- Drainage area = 827 sq. mi.
- River length = 88 mi.
- Max. elev. = 19.8 ft msl

This report summarizes the economic value of water, natural resources, and ecosystems in the **Nanticoke River** watershed in **Kent** and **Sussex** counties in **Delaware** and **Caroline**, **Dorchester**, and **Wicomico** counties in **Maryland** as:

1. **Economic activity** including **market/non-market** value of water quality, water supply, fish/wildlife, recreation, agriculture, forests, and public parks benefits.
2. **Ecosystem goods and services** (natural capital) value provided by **habitat** such as wetlands, beaches, open water, forests, and farms.
3. **Jobs and wages** directly and indirectly associated with the Nanticoke River watershed.

States in the Nanticoke River watershed

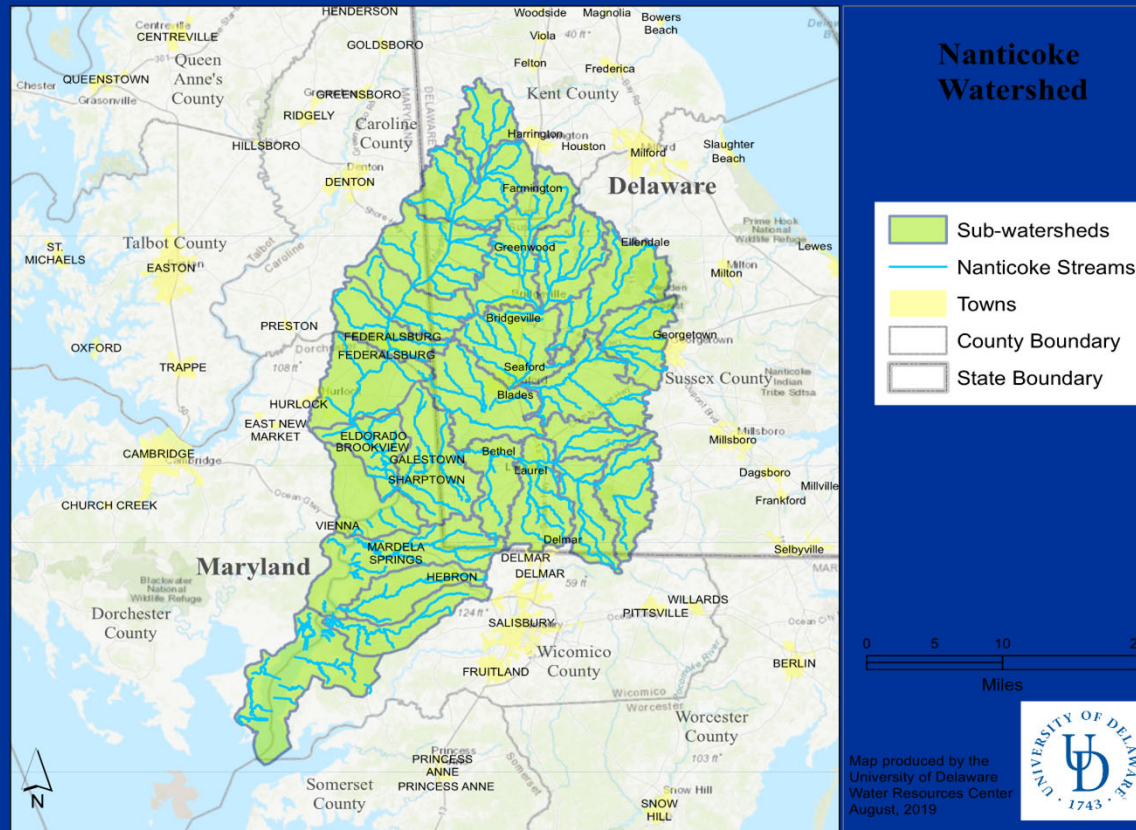
State	Area (mi ²)	Area (%)
Delaware	497	60%
Maryland	330	40%
Total	827	100%

Delaware

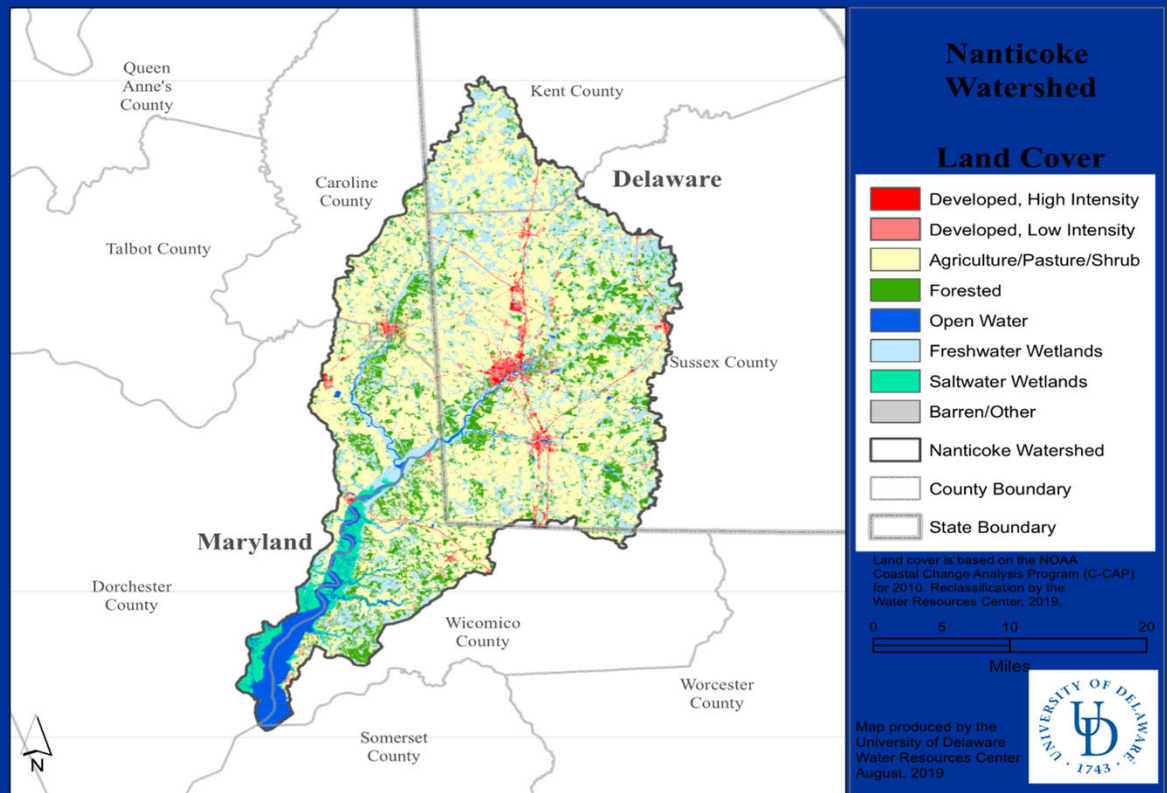
- Greenwood
- Bridgeville
- Seaford
- Bethel
- Vienna

Maryland

- * Bivalve
- * Cambridge
- * Sharptown
- *



Land Use	2010 (mi ²)	2010 (%)
Developed	34	4%
Agriculture	442	53%
Forested	113	14%
Open Water	35	4%
Freshwater Wetlands	177	21%
Saltwater Wetlands	24	3%
Barren/Other	1	0.1%
Total	826	100%



State	2000 Pop.	2010 Pop.	+/-	%
Delaware	59,194	69,016	9,822	16%
Maryland	19,805	21,179	1,374	7%
Total	78,999	90,195	11,196	14%

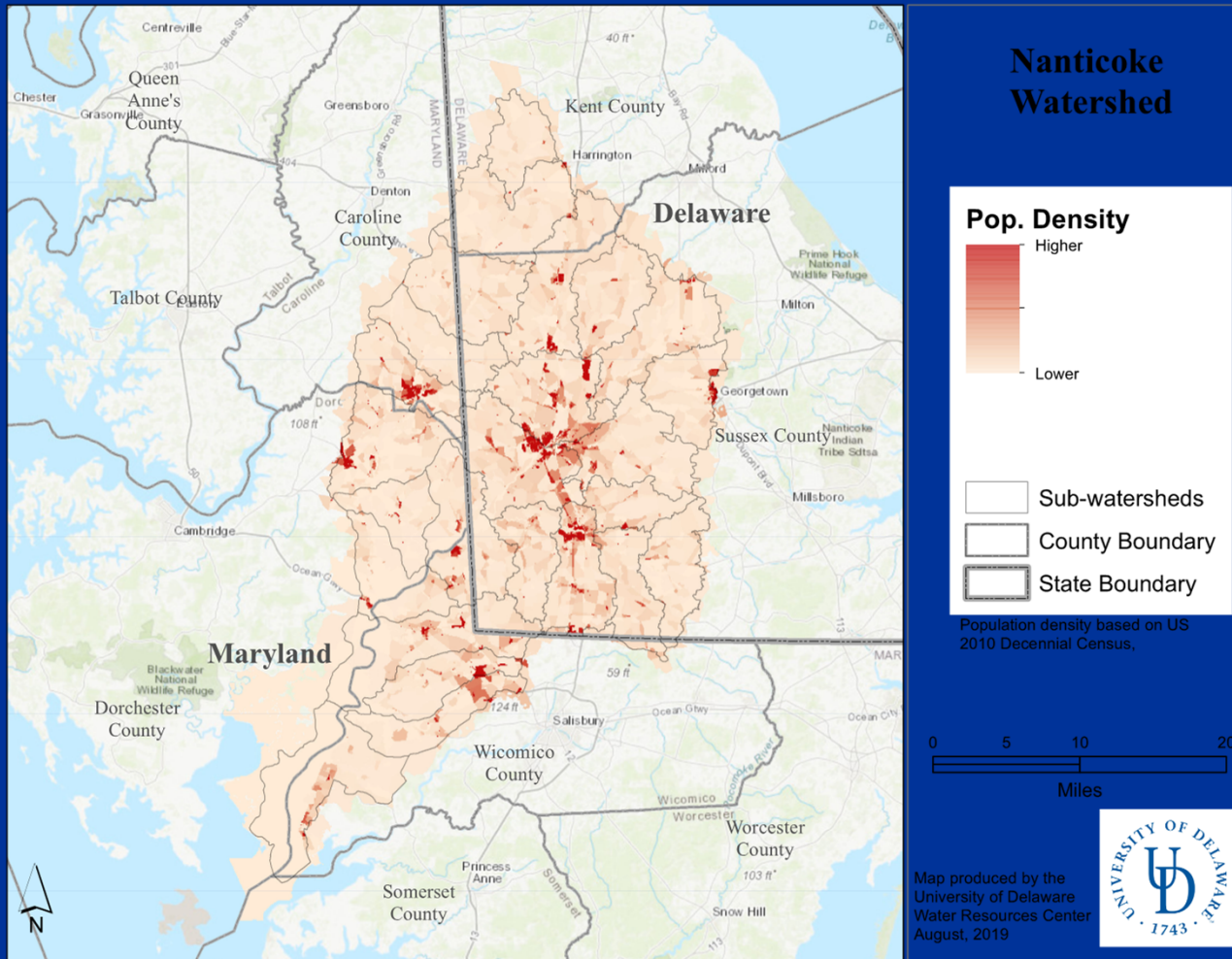
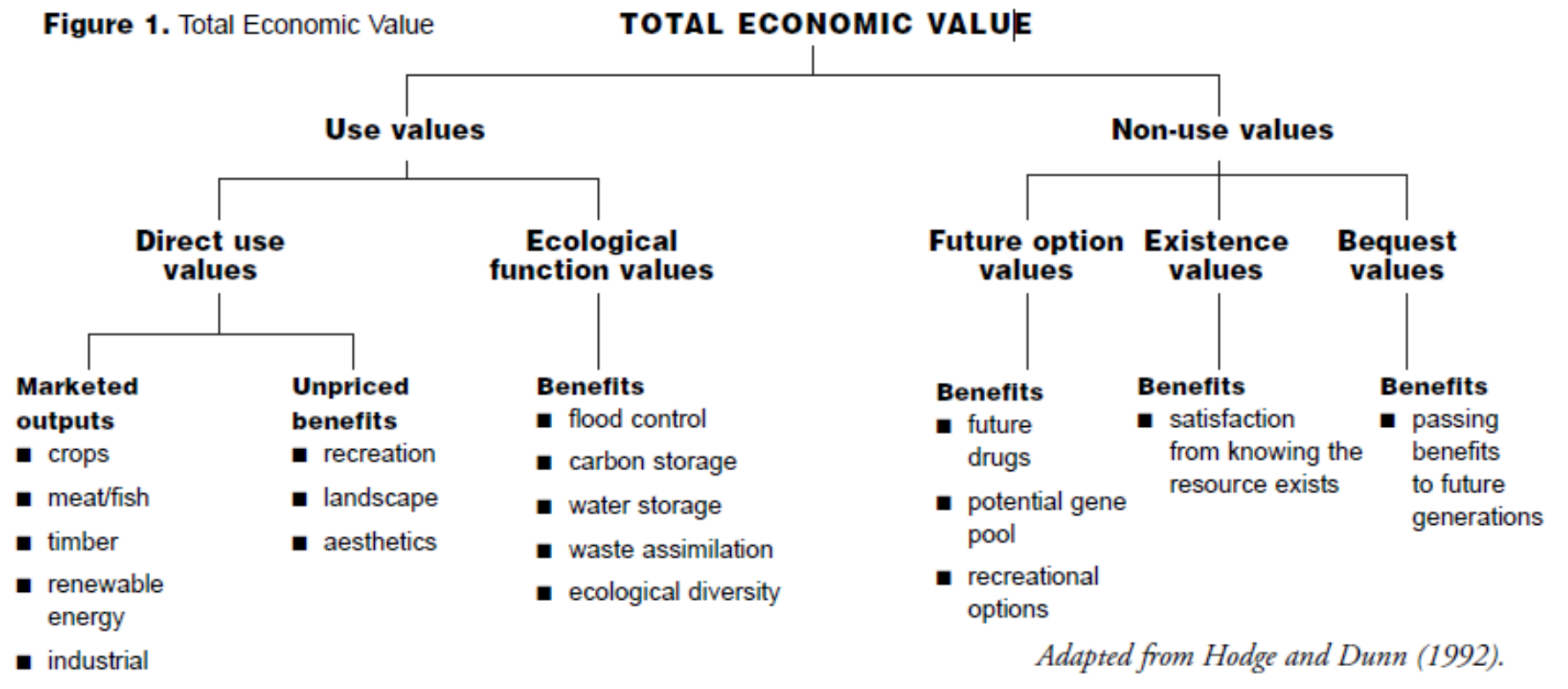


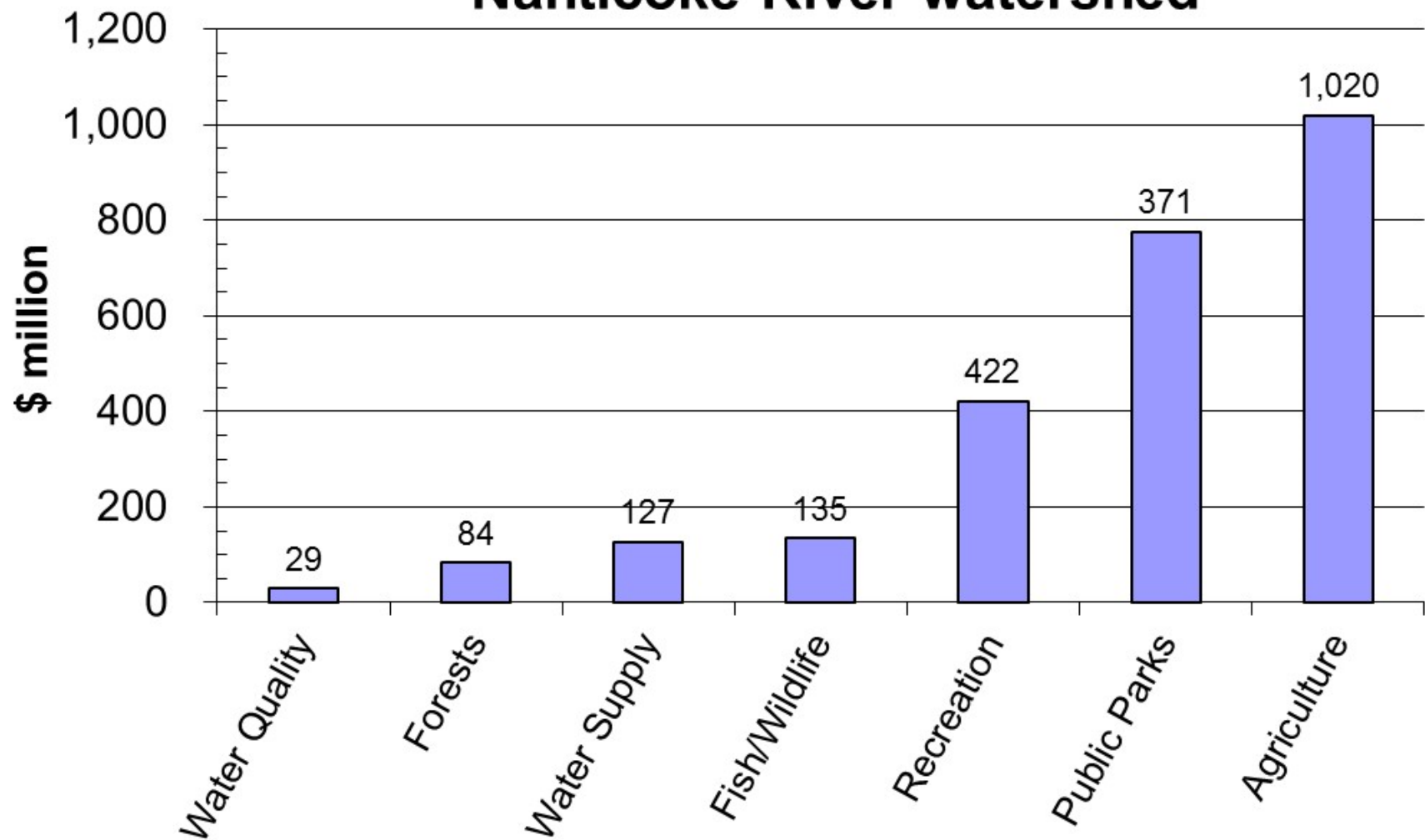
Figure 1. Total Economic Value



Annual Economic Activity Nanticoke River watershed

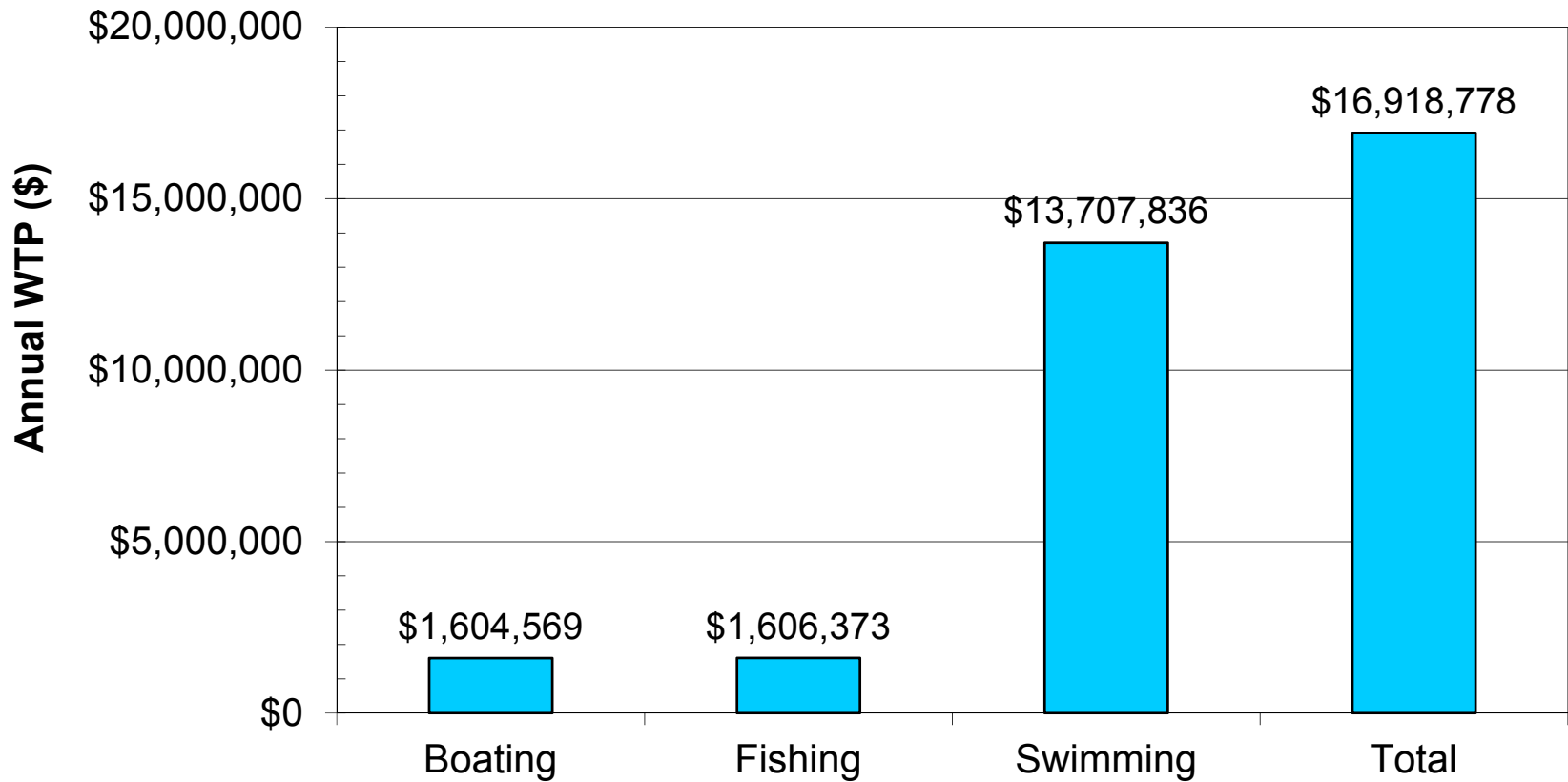
- Water Quality \$29 million
- Water Supply \$127 million
- Fish/Wildlife \$135 million
- Recreation \$422 million
- Agriculture \$1.1 billion
- Forests \$84 million
- Public Parks \$776 million
- Port Navigation \$4.5 million
- **Total \$2.6 billion**

Annual Economic Value Nanticoke River watershed



Water Quality

Willingness to Pay (WTP) for Improved Water Quality Nanticoke River Watershed (\$2020)



Property Value

Added property value due to improved water quality in the Nanticoke River
(EPA 1973, Leggett et al. 2000, Poor et al. 2007, Austin et al. 2007)

State	Bay Shore (mi)	Bay Shore (ft)	Area within 2000 ft of Bay (ac)	Property Value \$75,429/ac (\$ mil)	Increased Value @ 8% (\$ mil)	Annual Value 20 yr (\$ mil)
DE	36	191,347	7,757	179	14.4	0.7
MD	286	1,511,136	35,262	817	65.4	3.3
Total	322	1,702,483	43,019	997	79.8	4.0

Wastewater

The total market value based on treated wastewater rates in the Nanticoke River watershed is \$21,900 per day or **\$8.0 million** per year.

State	Wastewater Utility	Flow (mgd)
DE	Bridgeville WWTP	0.292
DE	Laurel WWTP	0.3
DE	City of Seaford WWTP	2
MD	Hurlock WWTP	1.65
MD	Vienna WWTP	0.1375
Total		4.38

Water Supply

At \$1,168 per million gallons, the value of untreated public water supplies in the Nanticoke River watershed 4.2 mgd is \$4,941/day or \$1.8 million/yr.

State	Municipality	Public Water Supply (mgd)
DE	Blades	0.25
DE	Bridgeville	0.48
DE	Delmar	0.4
DE	Greenwood	0.09
DE	Laurel	0.73
DE	Seaford	1.91
MD	Hebron	0.3
MD	Sharptown	---
MD	Vienna	0.072
Total		4.23

Irrigation

- Resources for the Future (1996) estimated the median value of irrigation withdrawals was \$198/ac-ft in \$1996 or \$402/ac-ft (\$1.31/1,000 gal) in \$2020 dollars.
- During 2010, 282,880 acres of cropland in the Nanticoke watershed (53.5% of watershed) were cultivated and 100,480 acres were irrigated (USDA 2017).
- The value of water needed to irrigate 9 inches of water over 100,480 acres at a use value of \$402/ac-ft is **\$125 million/yr.**

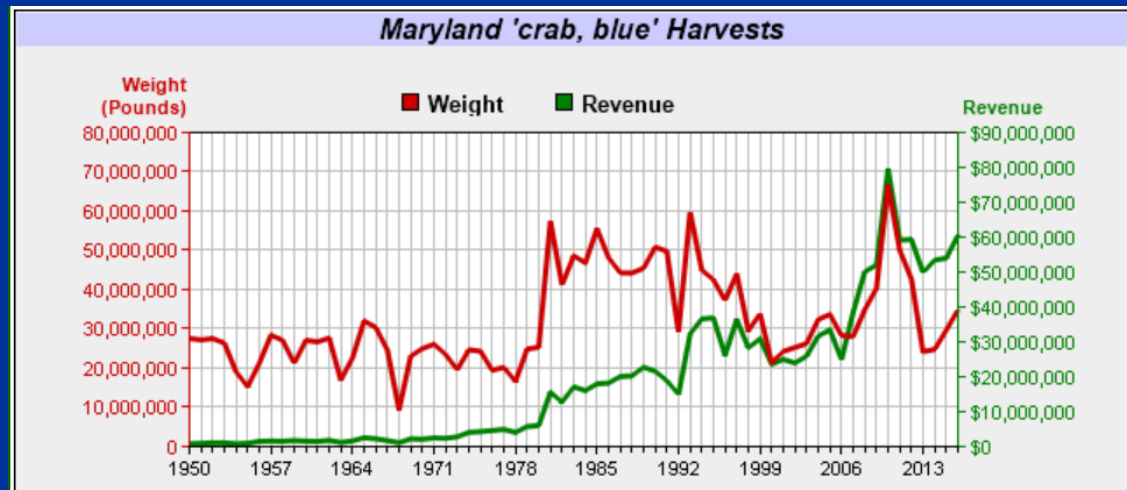
Fish and Wildlife

Contributions to local economy, Blackwater National Wildlife Refuge
(Carver and Caudill 2017)

Refuge	Recreation Visits	Economic Output	Employment Income	Total Jobs
Blackwater NWR	222,792	\$7,790,800	\$2,314,600	63

Blue Crab

- Chesapeake Bay Program (2019) about 594 million blue crabs in the Bay.
- Chesapeake Bay surface area is 4,479 sq. mi.
- Nanticoke estuary surface area is 28.6 square miles
- By proportion, 3.8 million blue crabs in the Nanticoke.
- At 1.5 blue crabs/lb pound, 3.79 million crabs equal 2.53 million lb.
- At \$1.74/lb value of Nanticoke blue crab fishery is **\$4.4 million/yr.**



Fishing, Hunting, Wildlife/Birding Recreation in Nanticoke River watershed (USFWS 2011)

Recreation Activity	DE (\$ mil)	MD (\$ mil)	Total (\$ mil)
Fishing	27	18	45
Hunting	10	9	19
Wildlife/Bird-watching	43	16	59
Total	80	43	123

Recreation value in the Nanticoke River watershed (OIA 2016)

Economic Activity	Delaware	Maryland	Total
Consumer Spending	\$220 mil	\$49 mil	\$269 mil
Participants	33,157	10,500	43,657
Jobs	2,059	381	2,440
Wages	\$68 mil	\$15 mil	\$83 mil

Recreational powerboat expenditures in the Nanticoke River watershed (NMMA 2014)

State	Rank Expenditures	Powerboat Expenditures (\$)	% Land of States in Watershed	Watershed Expenditures (\$)
Delaware	7	\$544 mil	26%	\$141 mil
Maryland	23	\$270 mil	3%	\$8 mil
Total		\$814 mil		\$149 mil

State parks visitation & visitor spending FY 2016/2017 (Rockport Analytics 2017)

State Park	Attendance	\$/Visitor-Day	Spending (\$)
Trap Pond State Park, DE	116,626	\$259	\$30,206,134

Agricultural sales in the Nanticoke River watershed (USDA 2017)

State	County	Farmland (mi ²)	Farms	Farm Sales (\$ mil)
Delaware	Kent	45	153	73
	Sussex	244	721	645
Maryland	Caroline	38	132	63
	Dorchester	59	143	73
	Wicomico	55	264	163
	Total	442	1,413	1,017

Economic benefits of forests (72,448 ac) in the Nanticoke River watershed (USFS)

Benefits	(\$/ac)	Nanticoke River watershed (\$)
Carbon Storage	827	59,914,496
Carbon Sequestration	29	2,100,992
Air Pollution Control	266	19,271,168
Energy Savings	56	4,057,088
Avoided Carbon Emissions	3	217,344
Total	1,181	85,561,088

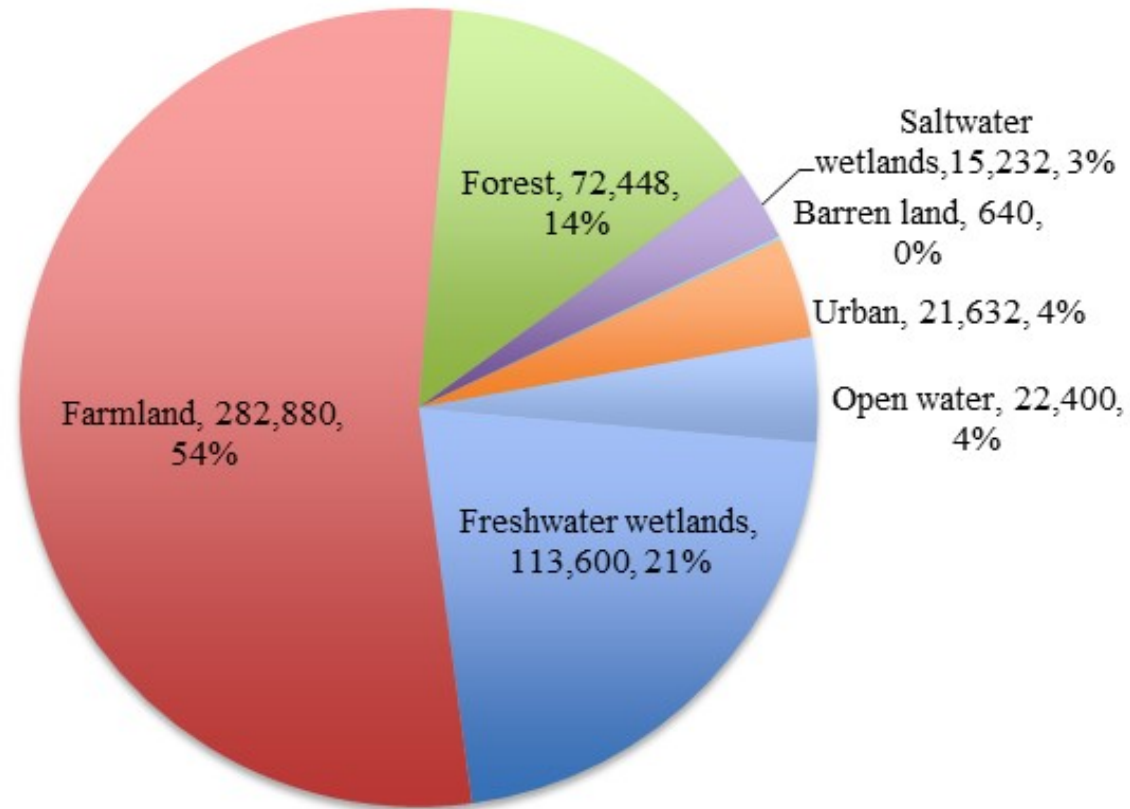
Value of state and county parks in the Nanticoke River watershed (Trust for Public Land 2009)

Parks (ac)	Health Benefits \$9,734/ac (\$ mil)	Community Cohesion \$2,383/ac (\$ mil)	Stormwater Benefit \$921/ac (\$ mil)	Air Pollution \$88/ac (\$ mil)	Total (\$ mil)
59,171	576	141	54	5.2	777

Port Navigation in the Nanticoke River watershed (Resources for the Future, Frederick *et al.* 1996)

- 22,400 acres of open water in river or 224,000 acre-ft.
- Median use-value navigation = \$20.33/ac-ft in \$2020
- Navigation value = **\$4.5 million**

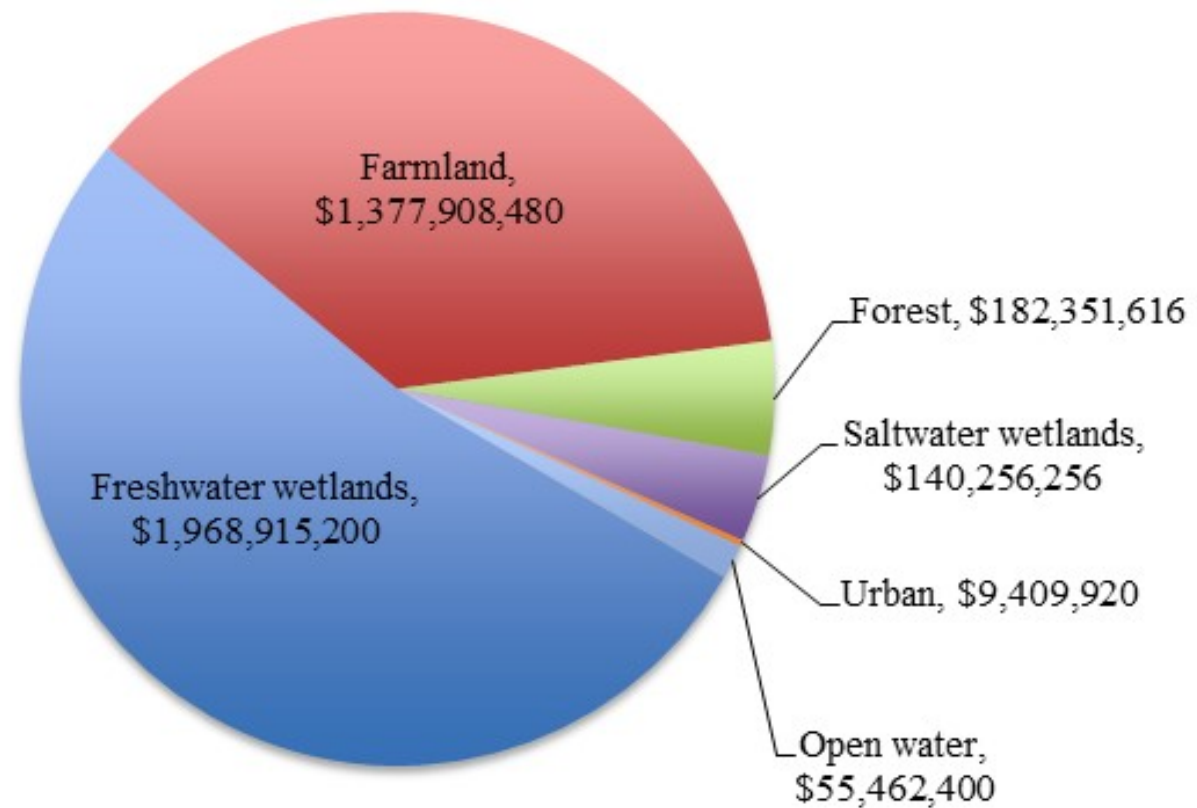
Ecosystems Area (acres) in the Nanticoke Watershed



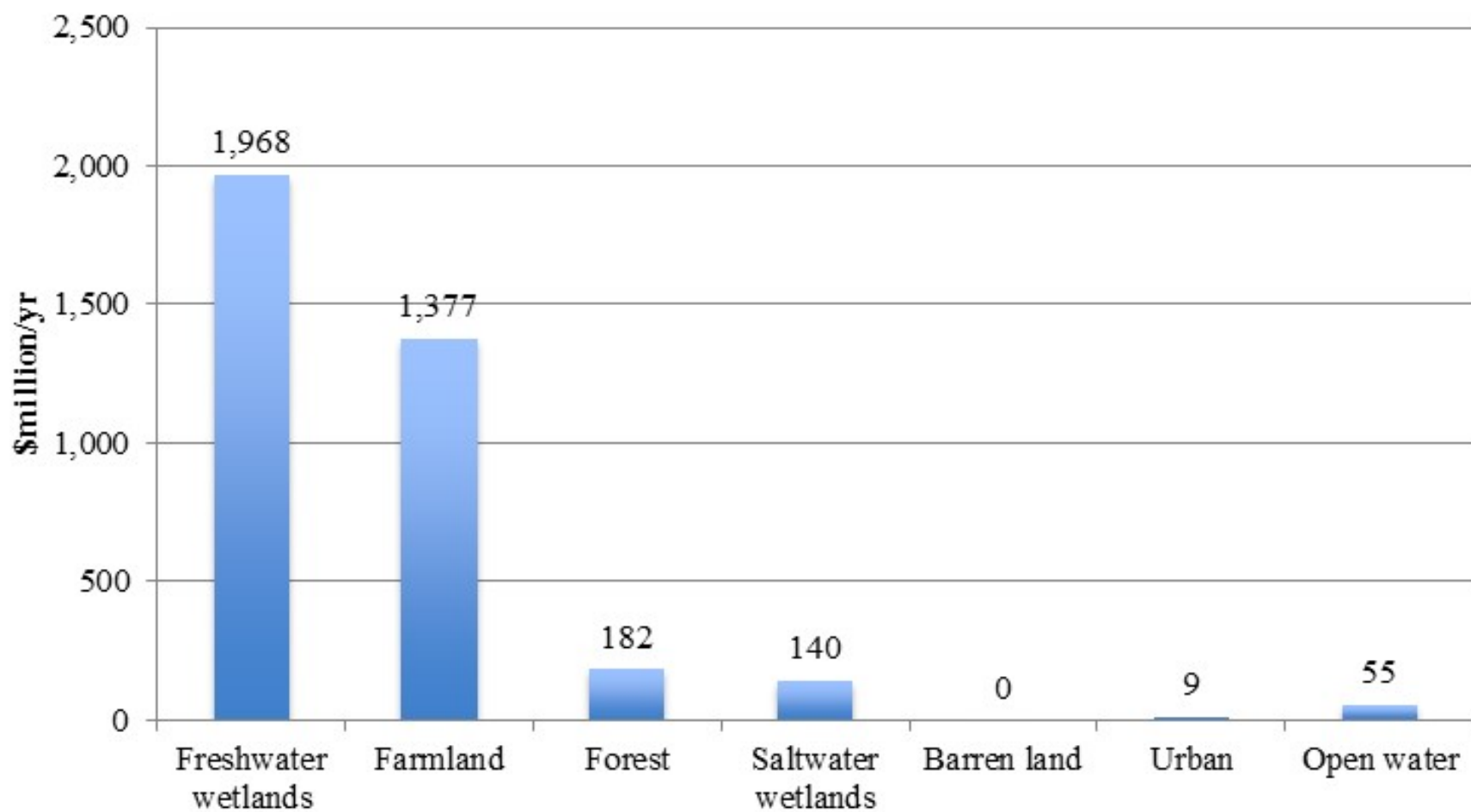
Value of ecosystem goods and services in the Nanticoke River watershed

Ecosystem	Area (ac)	Services (\$/ac/yr)	PV (\$)	NPV (\$)
Freshwater wetlands	113,600	17,332	1,968,915,200	63,989,744,000
Farmland	282,880	4,871	1,377,908,480	44,782,025,600
Forest	72,448	2,517	182,351,616	5,926,427,520
Saltwater wetlands	15,232	9,208	140,256,256	4,558,328,320
Barren land	640	0	0	0
Urban	21,632	435	9,409,920	305,822,400
Open water	22,400	2,476	55,462,400	1,802,528,000
Nanticoke Watershed	528,832		3,734,303,872	121,364,875,840

Value of Natural Goods and Services in the Nanticoke Watershed

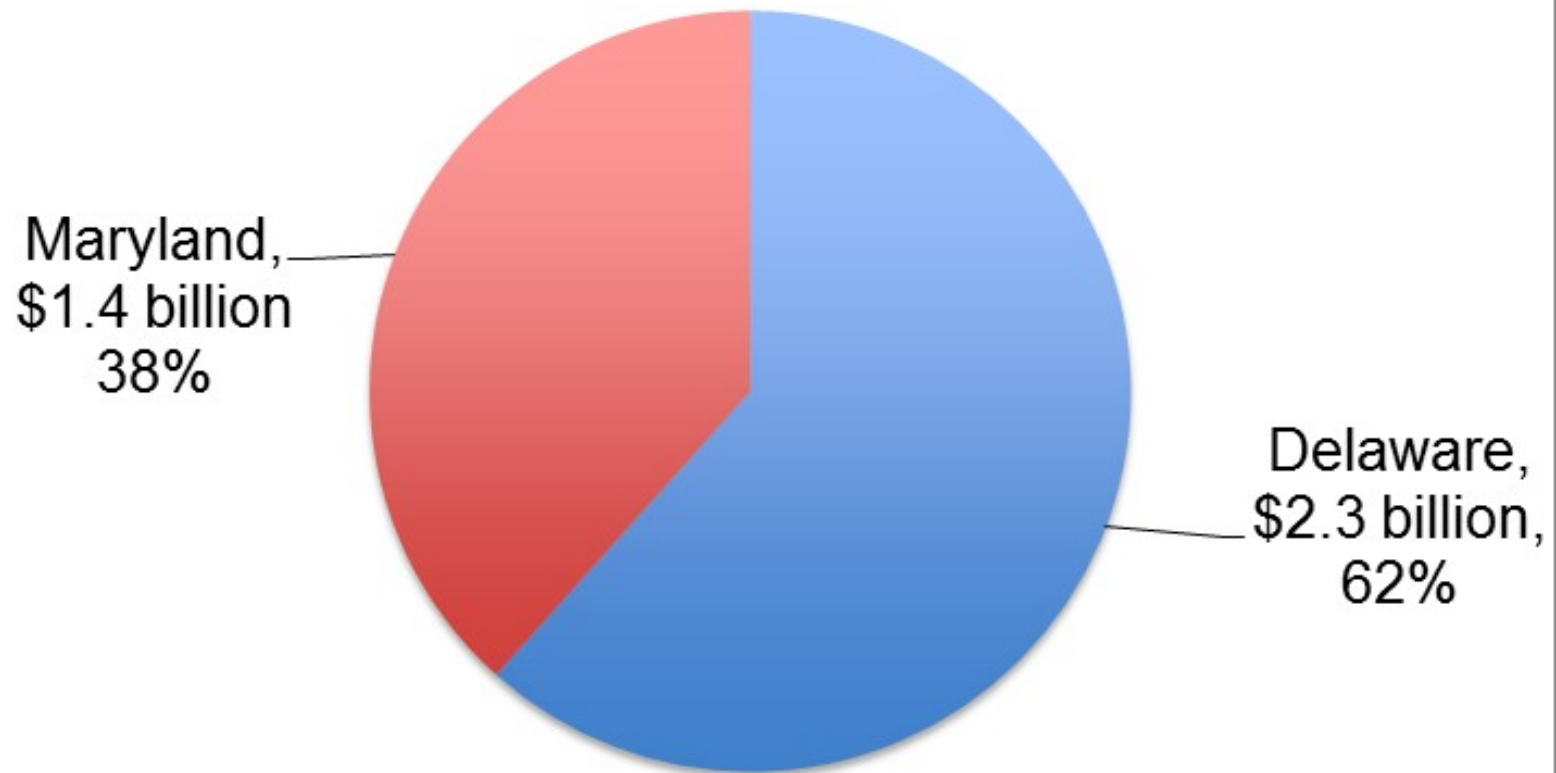


Ecosystem Services Value Nanticoke Watershed



Ecosystem Goods and Services

Ecosystem Services Value of Nanticoke Watershed



Jobs and wages directly and indirectly related to Nanticoke River watershed

Sector	Jobs	Wages (\$ mil)	Data Source
Direct Watershed-Related	4,983	113	U.S. Bur. of Labor Statistics (2016)
Indirect Watershed-Related	5,980	90	U.S. Census Bureau (2016)
Fishing/Hunting/Birding	3,744	123	U.S. Fish & Wildlife Service (2011)
National Wildlife Refuge	63	2.3	U.S. Fish & Wildlife Service (2014)
Outdoor Recreation	2,647	90.6	Outdoor Industry Association (2016)
State Parks	58	1.7	Mates and Reyes (2006)
Farm	2,195	36.6	USDA Agriculture Census (2017)
Wetlands	110	2.5	NOAA Coastal Mgmt. (2013)
Watershed Organizations	4	0.3	
Water Supply Utilities			
Wastewater Utilities	15	0.8	MDOE and VMS (2013)
Nanticoke Watershed	19,799	461	

Coastal employment, wages, and GDP in the Nanticoke River watershed
(NOEP 2016)

Sector	Employment	Wages (\$ mil)	GDP (\$ mil)
Construction	2,189	106.6	219
Financial Activities	1,309	71.2	539
Education/Health Services	8,613	434.9	434
Information	246	14.7	71
Leisure/Hospitality	5,746	117	227
Manufacturing	4,388	198	621
Natural Resources/Mining	436	16.7	22
Other Services	1,145	34.3	88
Professional/Business	3,210	153.1	271
Public Administration	533	28.6	242
Trade/Transportation/Utilities	7,594	272.5	627
Total	35,409	1,447.6	3,361

The water, natural resources, and ecosystems in the Nanticoke River watershed contribute an economic value of **\$460 million to \$2.6 billion** with **\$3.7 billion in natural benefits** annually to the regional Delaware and Maryland economy.

- 1. Economic value:** The Nanticoke River watershed contributes over **\$2.6 billion** in annual economic activity from water quality, water supply, fish/wildlife, recreation, agriculture, forests, and public parks benefits.
- 1. Ecosystem goods and services:** The Nanticoke River watershed provides **\$3.7 billion** annually in ecosystem goods and services in 2020 dollars, with a net present value (NPV) of **\$121 billion** over 100 years.
- 1. Jobs/Wages:** Natural resources within the Nanticoke River watershed directly and indirectly supports over **19,800 jobs** with **\$461 million** in annual wages.

What is the Nanticoke River Worth?



Annual Contribution to Local Economies:



Through its ecosystems, waterways, and the natural resources it supports, the Nanticoke River provides over 14,500 jobs and contributes up to \$2.6 billion annually to the economies of Delaware and Maryland.

To read the full report, go to NanticokeRiver.org

Natural Benefits

Thriving wetlands can prevent flooding and help produce clean drinking water.



Water Quality and Supply
\$156.1 million



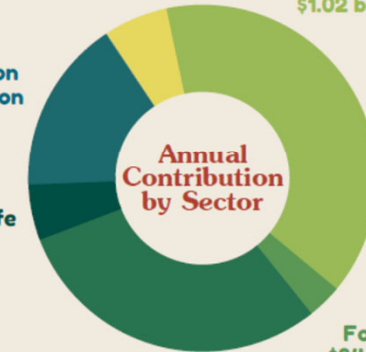
Agriculture
\$1.02 billion



Recreation
\$422 million

Fish and Wildlife
\$126.8 million

Clean water means healthy fish, crabs, and oysters for commercial fishermen. Our pristine rivers and forest also attract recreational anglers, hunters, and birders.



Public Parks
\$776 million

Forests
\$84 million

Forests generate clean air, shade, and oxygen. Trees also cool cities, reducing AC costs for citizens, increase property value, and attract songbirds.

The Nanticoke River provides a clean source of water for irrigation on many farms. Our healthy forests, wetlands, and planted buffers clean run off from cities and farms before it reaches the Nanticoke. Birds and pollinators living in our natural areas also eat pests and pollute our crops.



Economic information provided by:
University of Delaware,
Water Resources Center

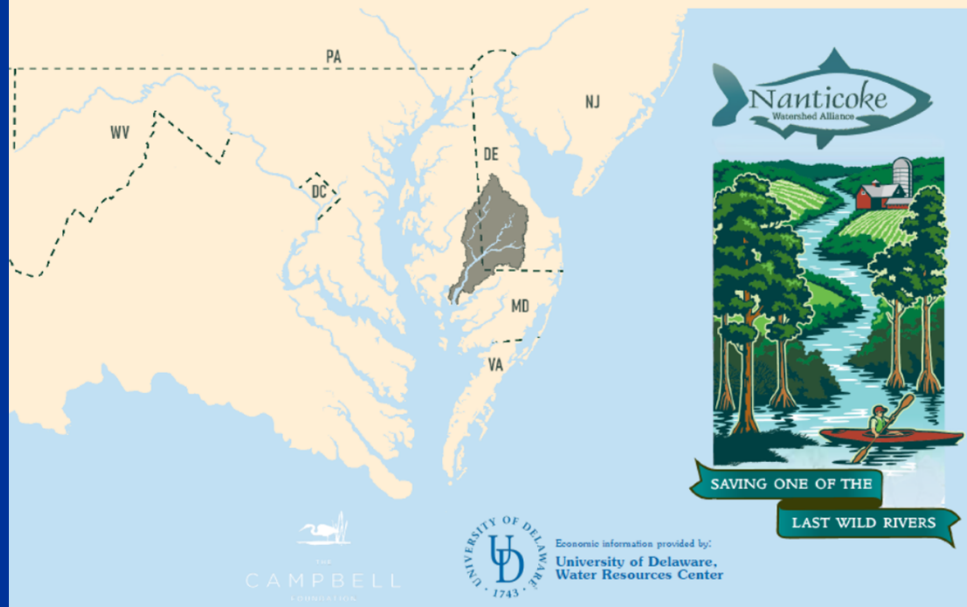


If you would like to join us, please contact us at Info@NanticokeRiver.org, or visit us online at www.NanticokeRiver.org

The water, natural resources, and ecosystems contained in the Nanticoke River watershed are an economic engine for the region.

The Nanticoke River and its watershed, all the land that drains into the river, provide real and significant economic benefits and are worthy of investment to keep their natural resources healthy and productive.

The Nanticoke Watershed Alliance does a variety of different things to help protect the river. We are a non-advocacy group, so we never work to change laws. Instead, we listen to the local farmers, homeowners, businesses, and governments that work with us to create realistic solutions that make everyone happy.



Questions?