

Profile
ARTICLE

Wastewater Engineer: Dr. Ashley Murray

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BY NATIONAL GEOGRAPHIC EDUCATION

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Ashley is a National Geographic [Emerging Explorer](#). She is working with businesses and [governments](#) in Africa to [reuse wastewater](#) as a [profitable enterprise](#).

Ashley's business, Waste Enterprisers, is actually a [network](#) of many small businesses. Waste Enterprisers uses [human waste](#) as its [primary](#) input. (Yes, "human waste" is poop!) The waste contributes to such enterprises as a fish farm and, possibly, industrial [fuel](#).

By making people aware of the financial cost of [sanitation](#) and waste, Ashley says we can begin to put a serious value on both the [raw materials](#) ([nutrients](#) in waste) and sanitation itself.

EARLY WORK

Ashley grew up with the "[reduce](#), reuse, and [recycle](#)" goal. Although wastewater was never a [dominant](#) issue in Andover, Massachusetts, where she grew up, she was always aware of the importance of saving water and keeping it clean.

Ashley earned her [PhD](#) from the Energy and Resources Group at the University of California at Berkeley.

MOST EXCITING PART OF YOUR WORK

"Trying to prove sanitation can be a [viable](#) business model."

MOST DEMANDING PART OF YOUR WORK

Obsession. "I'm always thinking about the possibilities for new methods, [resources](#). . . . My friends are sick of hearing about [poop]!" she laughs.

HOW DO YOU DEFINE GEOGRAPHY?

"The social and cultural [context](#) of an idea or place."

GEO-CONNECTION

Ashley first became aware of the sanitary **hazards** posed by wastewater through **literature** and personal experience. National Geographic Fellow Sandra Postel’s book *Last Oasis: Facing Water Scarcity* forced Ashley to confront the idea that Earth has a limited supply of **freshwater**—for **agriculture**, drinking, **industry**, and sanitation.

When Ashley moved to Ghana, the **implications** of a lack of freshwater became clear. “Any surface water is an open **sewage** stream,” she says. “It’s hard to overstate the **enormous** health and **environmental impacts** of **inadequate** sanitation.”

It was also in Ghana that Ashley realized the biggest barrier to sanitation is **economics**. “The standard model is that the government takes care of waste. Well, in a developing **nation** like Ghana, the government can’t afford to be responsible for all the waste. So we needed a new business model. The new model provides **incentives** to **entrepreneurs** and residents to recycle their waste.”

For a small **fee**, Waste Enterprisers will pick up a client’s waste and responsibly put it to use. “It’s changing the way we **finance** sanitation, and looking at waste as a resource—chemical **fertilizer**,” Ashley explains.

The fertilizer feeds an **aquaculture** farm that uses a system of ponds. Hazardous chemicals are filtered out in the first series of ponds. By the final ponds, the water is full of nutrients that allow **catfish** to **flourish**.

Even though the ponds are safe, Ashley is quick to say the fish could never be sold raw. However, fish in Ghana are not sold as a raw product. They are **smoked** until they resemble a dry, **durable**, **jerky**-like product. “The way fish is sold in Ghana makes it possible for fish grown in fish ponds to be safely sold and eaten,” Ashley says.

Ashley admits the idea of eating fish grown in a pond fertilized with human waste may be a tough sell to Western consumers. “The **technology** is transferrable, but not socially or culturally.”

SO, YOU WANT TO BE AN . . . ENVIRONMENTAL ENTREPRENEUR

Ashley strongly recommends pursuing an **engineering** degree. “Any engineering program gives you a strong tech base, and you can use that for almost any business.”

GET INVOLVED

Although she now lives in Accra, Ghana, Ashley lived in China and India for years, and she encourages everyone to “travel for the sake of travel.”

Just visiting different **regions** or countries can result in “real exposure to other **cultures**,” she says. “It can be really rewarding, and you’re also spending money in the area and contributing to the **economy**.”

VOCABULARY

Term	Part of Speech	Definition
agriculture	<i>noun</i>	the art and science of cultivating the land for growing crops (farming) or raising livestock (ranching).
aquaculture	<i>noun</i>	the art and science of cultivating marine or freshwater life for food and industry.
catfish	<i>noun</i>	freshwater fish with wiry organs that look like whiskers on its upper jaw.

chemical	<i>noun</i>	molecular properties of a substance.
client	<i>noun</i>	person who employs a professional or expert, such as a lawyer, accountant, or engineer.
confront	<i>verb</i>	to address a problem or person directly.
consumer	<i>noun</i>	person who uses a good or service.
context	<i>noun</i>	set of facts having to do with a specific event or situation.
culture	<i>noun</i>	learned behavior of people, including their languages, belief systems, social structures, institutions, and material goods.
developing world	<i>noun</i>	nations with low per-capita income, little infrastructure, and a small middle class.
dominant	<i>adjective</i>	main or most important.
durable	<i>adjective</i>	strong and long-lasting.
economics	<i>noun</i>	study of monetary systems, or the creation, buying, and selling of goods and services.
economy	<i>noun</i>	system of production, distribution, and consumption of goods and services.
Emerging Explorer	<i>noun</i>	an adventurer, scientist, innovator, or storyteller recognized by National Geographic for their visionary work while still early in their careers.
engineering	<i>noun</i>	the art and science of building, maintaining, moving, and demolishing structures.
enormous	<i>adjective</i>	very large.
enterprise	<i>noun</i>	a project, usually one seeking a profit.
entrepreneur	<i>noun</i>	person who starts and manages a business.
environmental impact	<i>noun</i>	incident or activity's total effect on the surrounding environment.
fee	<i>noun</i>	price or cost.
fertilizer	<i>noun</i>	nutrient-rich chemical substance (natural or manmade) applied to soil to encourage plant growth.
finance	<i>verb</i>	to fund or provide money to an organization or individual, usually for a specific purpose.
financial	<i>adjective</i>	having to do with money.
flourish	<i>verb</i>	to thrive or be successful.
freshwater	<i>noun</i>	water that is not salty.
fuel	<i>noun</i>	material that provides power or energy.
government	<i>noun</i>	system or order of a nation, state, or other political unit.
hazard	<i>noun</i>	danger or risk.
human waste	<i>noun</i>	byproduct of human digestion - feces or urine.
implication	<i>noun</i>	suggestion or hint.
inadequate	<i>adjective</i>	not enough or not of high-enough quality.

incentive	<i>noun</i>	offer or encouragement to complete a task.
industrial	<i>adjective</i>	having to do with factories or mechanical production.
industry	<i>noun</i>	activity that produces goods and services.
input	<i>noun</i>	something that is contributed, or put in, to something else.
jerky	<i>noun</i>	dry, chewy strips of meat that have been preserved by smoking or other methods.
literature	<i>noun</i>	written material, including novels, poetry, drama and history.
nation	<i>noun</i>	political unit made of people who share a common territory.
network	<i>noun</i>	series of links along which movement or communication can take place.
nutrient	<i>noun</i>	substance an organism needs for energy, growth, and life.
PhD	<i>noun</i>	(doctor of philosophy) highest degree offered by most graduate schools.
pond	<i>noun</i>	small body of water surrounded by land.
primary	<i>adjective</i>	first or most important.
profitable	<i>adjective</i>	able to make money.
raw material	<i>noun</i>	matter that needs to be processed into a product to use or sell.
recommend	<i>verb</i>	to advise, approve, or suggest.
recycle	<i>verb</i>	to clean or process in order to make suitable for reuse.
reduce	<i>verb</i>	to lower or lessen.
region	<i>noun</i>	any area on the Earth with one or more common characteristics. Regions are the basic units of geography.
resource	<i>noun</i>	available supply of materials, goods, or services. Resources can be natural or human.
reuse	<i>verb</i>	to use again.
sanitation	<i>noun</i>	promotion of hygiene, health, and cleanliness.
sewage	<i>noun</i>	liquid and solid waste material from homes and businesses.
smoke	<i>verb</i>	to preserve meat by drying it with smoke.
technology	<i>noun</i>	the science of using tools and complex machines to make human life easier or more profitable.
transfer	<i>verb</i>	to pass or switch from one to another.
travel	<i>noun</i>	movement from one place to another.
viable	<i>adjective</i>	capable of growing and sustaining itself.
wastewater	<i>noun</i>	water that has been used for washing, flushing, or industry.

For Further Exploration

Websites

- Waste Enterprisers



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