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A man in a dark shirt and shorts is crouching on a beach. The beach is covered in a dark, viscous oil spill that has washed onto the sand. The man is looking directly at the camera with a serious expression. In the background, waves are breaking on the shore under a clear blue sky.

ENVIRONMENT VS. THE ECONOMY

As the Gulf seafood industry recovers, can lessons be learned from a "Sim" game by the University of Virginia and Philippe Cousteau?



ENVIRONMENT VS. THE ECONOMY

Philippe Cousteau and UVA Seek “Sweet Balance” Through Gaming

By Lisa Lupo

It is the year 2000. The economy is stable. Agriculture and commodity prices are on the rise, and prospects for land development are good. The Chesapeake Bay, however, is in slow decline. Current land use practices are threatening to increase the flow of nitrogen and phosphorus into the Bay and the deep waters of the Bay are losing the ability to sustain life.

Fast forward to the year 2016. Economic and environmental decisions made by farmers, watermen, developers and regulators across the seven watersheds have caused continual decline in the health of the Bay. In particular, the Eastern Shore River watershed economy is down, environmental quality is low and unemployment is up to 6.88%.

Although these futuristic “predictions” are derived from The Bay Game, a simulated game of logic developed by the University of Virginia (UVA), they are based on real stakeholder decisions, real-world impact of those decisions, and the environmental reality that nobody wins unless everybody wins.

“Without a healthy ecosystem and environment, in the long run nobody has anything,” said Philippe Cousteau, co-founder of Azure Worldwide and EarthEcho International and grandson of famed ocean explorer Jacques Cousteau.

“I think that’s the beauty of this game, that it helps people understand that this is

collaborative,” he said. “These are so often adversarial relationships—policymaker, waterman, farmer, citizen—and that is part of the problem. If everybody doesn’t win, then nobody wins because without a healthy environment, we can’t have a healthy economy.

“Everybody has to win,” he said. “But to do that everybody has to care.”

FINDING BALANCE. The interactive Bay Game simulates the conditions of the seven Chesapeake Bay watersheds with players taking on the roles of those who live there and depend on the Bay resources for their livelihood. As they make decisions, players see the impact on the economic well-being and quality of life of the watershed and on the health of the Bay. In addition to use in UVA classes, the university held a Bay

Game event in April in which more than 200 students and real-life Bay stakeholders took part. The game is continuing to be used in a variety of applications, with inroads being made to take the game to more stakeholders and apply it to various environments. [See *The Bay Game*, page 14 for game play and facts.]

"It is a simulation; the game part comes from people trying to achieve a goal," said Jeffrey Plank, UVA associate vice president for research. "The goal is to find a sweet balance as a farmer or a waterman where I can make a living and watch the Bay health, if not improve, at least not get worse."

Although focused on the Chesapeake Bay area, the findings from and lessons of the game are universal, particularly to the food industry that is dependent on the health of the environment and the economy for the safety, quality and amount of its supplies.

In the early development phases, Cousteau joined the UVA team to partner on *The Bay Game* because of its uniqueness and potential to help real-world players understand the importance of collaboration and apply it to their real-world roles.

"I've always believed in the power of technology and the application of technology for education," Cousteau said. "So when I saw what UVA had developed, I was blown away."

In real-world situations, it is not always easy to see the impact that one's decisions make on others. But in *The Bay Game*, as players take on and make decisions in the various roles, they are able to see short- and long-term results of their—and other stakeholders'—decisions on their own watershed and the Bay as a whole.

"That's the message we're trying to bring across," Cousteau said. "Having players participate in a game that demonstrates the importance of balancing the needs of all the different stakeholders, including the environment, is truly revolutionary."

UNIVERSAL APPLICATION. "I think one of the best parts about this game," Cous-

PHILIPPE COUSTEAU

Explorer of Human-Environment Connections

Grandson of the famed Captain Jacques-Yves Cousteau, Philippe Cousteau works with environmental issues around the world, through which he learned that exploring the connections between humans and the environment is as important as exploring nature itself.

As co-founder of Azure Worldwide, a strategic environmental design, development and marketing company, Cousteau partnered with the University of Virginia in development of *The Bay Games*. Cousteau is also CEO of EarthEcho International, a non-profit organization with the goal to engage and empower people to take action through education, unbiased advocacy and a commitment to action.

Throughout the Gulf of Mexico oil crisis, Cousteau advocated for the people and the wildlife in the Gulf. He has visited the area to learn first hand the impact on the people and the ecosystem, and speaks out about environmental issues through documentaries, media appearances, congressional hearings, books, articles and speeches.

As chief ocean correspondent for Discovery's Planet Green, Cousteau works on various ocean- and water-focused documentary programs, including hosting of the ocean-focused program *Blue August*, and the upcoming *Oceans Blue*, and he has been featured in television and radio programs across the country.

Cousteau is co-author of *Going Blue, A Teen Guide to Saving our Oceans, Lakes, Rivers & Wetlands* (FreeSpirit Publishing, 2010); has written many published magazine articles; and is chief spokesperson for Environmental Education for Discovery Education, a provider of K-12 educational content. In 2008, he was named to Smithsonian Magazine's list of "37 under 36, America's Young Innovators in the Arts and Sciences." He has lectured at such institutions as The United Nations and Harvard University and was recently profiled by Bob Woodruff in an ABC News/Planet Green documentary.



Phillipe Cousteau, the grandson of famed ocean Captain Jacques Cousteau, partnered with University of Virginia developers to create and promote *The Bay Game*.

teau said, "is that it's starting here in the Chesapeake Bay, because it is America's Estuary. It's one of the largest, most diverse estuaries in the United States. And it's in

dire trouble. It's a dying system.

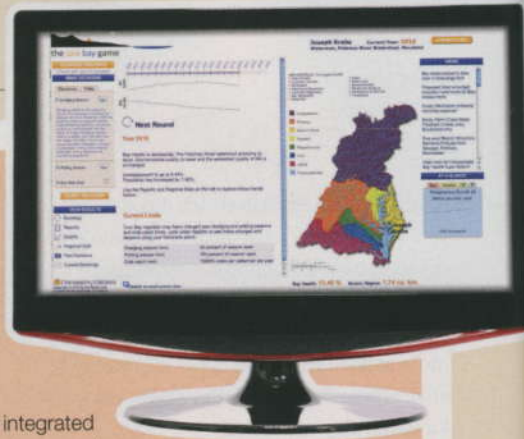
"The great part about this game is it is one of those tools that we can use to protect, enhance and restore the system," he

THE BAY GAME

In the Bay Game, developed by a multi-disciplinary team of UVA faculty members and students in partnership with Azure Worldwide's co-founder Philippe Cousteau, players make decisions about their livelihoods; and see the impact of these decisions on their own economic well-being, on each other and on the health of the environment.

Game Facts

- The game is a large-scale simulation, "sim game," that combines elements of a highly integrated model of the Chesapeake Bay watershed using systems dynamics modeling techniques and an interactive game interface.
- The watershed is represented as a collection of seven watershed regions—the Susquehanna River, Patuxent River, Eastern Shore, Potomac River, Rappahannock River, York River and James River—and the Bay itself.
- Players represent stakeholders in each regional watershed and the northern and southern portions of the overall bay watershed, with one player representing multiple stakeholders of a role, e.g. a player in the role of a farmer may represent the actions of 3,000 farmers of that watershed.
- Game play time is flexible. An April Bay Game Event included more than 200 players and took place over two hours. Other games conducted as part of university classes have continued through two weeks or more. In such cases, participants often talk and conduct research between moves.
- Player roles include:
 - Farmers, representing approximately 64,000 farms, make decisions regarding both crop and livestock farming practices.
 - Land developers make decisions to buy and sell land, and to develop property through conventional or sustainable practices.
 - Watermen make decisions on crab fishing related to the method of harvesting (dredging or potting) and the length of the harvesting season. They can also invest in new equipment to increase their efficiency weighed against the required cash investment.
 - Policymakers make decisions on land use, the crab industry and agricultural policy, and incentivize or curtail other players' decision-making through the choices they make in their respective areas of authority.
 - All players also represent members of the public and enter their feelings about the economy, the environment and their perceived quality of life in the region.
- The game template is flexible regarding the period of time over which results are projected. Currently, the game projects possible outcomes over a 20-year period.



said. And not just the Bay system but virtually any watershed.

"That's why this really is a game changer," Cousteau said. "What UVA was able to do was develop a system that was replicable. By changing the parameters and applying different data, it can be applied to various environments and situations—including that of the recent Gulf oil spill." (See *Can We "Game" the Oil Spill*, page 35.)

"It's important to remember that the Chesapeake Bay game is absolutely a science-based system," he explained. "It's not a simulator game that's just based off of wishful thinking and random ideas. This is based off of tens of thousands of data points that really accurately model what the consequences of the players' actions are on the health of the system."

Because it is science based and replicable to any watershed in the world, he said, it is a very important tool, not only from an

educational perspective, but from a real-world policy-making perspective as well.

POLITICAL NEUTRALITY. This is also because the game does not focus simply on environmental issues and sustainability. Rather it takes a range of values into consideration, allowing players to weigh profitability, environment and quality of life values in decision making. "It's a way that we have of incorporating player values into the game," Plank said.

Players often come into the game expecting it to be pro-environmental. So the game's political and value neutrality adds validity for many participants, said Dave Smith, environmental sciences professor. Real-world people are facing real-world dilemmas in economic, environmental and quality of life decision making.

"In the game," Smith said, "we are defining sustainability as not only environ-

mental sustainability, but also economic sustainability."

"When economic challenges occur, the environment is not far behind," Cousteau said. "So how do you find a way for people to exist in balance with the environmental system, so that the economy can be successful in the long run—as well as the environment? That takes a little bit of give on all sides, and that's the reality."

Someone could go out and catch all the crabs in the Bay this year and make a 'boatload' of money; then tomorrow, and next year, there wouldn't be any crabs left, Cousteau said. "So there's just balance. And it is recognizing that and striving to find that balance that makes sure that the environment is strong and healthy, because it is the bearer of the fruits upon which we as a species—clean water, fresh air, food—rely."

GAME RESULTS. What UVA research-

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ers are finding in game play is that many players come into the game thinking they are well-versed on the problems and solutions, but end the game realizing that there is much more to learn. And it is not just UVA student players who come to that realization, but also the real-life farmers, watermen, environmentalists and policymakers who have joined in game play.

At the April event, players were interviewed prior to game start and after its conclusion, Smith said, relating the comments of a group of environmental scientists as an

any particular focus on the environment. Rather they are told to play as they would if they were facing a real-world situation and are challenged to make a profit in their various roles, Plank said. Players are told, he said, "You are making your livelihood as a waterman or farmer, but be aware of the environmental impacts too.

"What we've found is that it's not easy to balance the economy and the environments." But if changes aren't made, Plank said, these conditions jeopardize the environmental and economic health of the Bay.



Philippe Cousteau interacts with role players in the April Bay Game gameplay that brought together UVA students with real-world farmers, watermen, regulators and other stakeholders.

example of the increased understanding. In the pre-game interview, the environmentalists said they knew a lot about the problems of the Bay and the solutions that are needed. "It's all about run-off from the farmers. We need to find a policy to stop it," they said. Afterward, however, the perspective was a bit different: "I thought I knew the answer," one of the environmental scientists said. "I didn't realize how interconnected it all is."

This, Smith noted, has been a key finding across roles and game play.

COLLABORATING FOR IMPROVEMENT.

As the opening paragraphs of this article illustrated, the Bay isn't faring any better in game play than in reality. Players are given instruction on the game but not told to have

On the upside, players tend to improve decision making for mutual benefit as the game progresses, particularly through collaboration—a point continually stressed by both the UVA team and Cousteau.

During game play, Plank said, it's not unusual for the regulated to talk with regulators to determine a balance of needs. "As the game moves on, more and more people are talking together during their moves—and that's a good thing.

"In the real world when stakeholders get together in policy meetings, you don't see that kind of collaboration," he said. But the game enables players to see how everything is interconnected, thus encouraging communication and collaboration.

As the game progresses and players see



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different watersheds doing better than their own, they start looking to see what that group is doing differently, and generally find the difference to be the “winning” teams’ collaboration. “People learn that if they work together, they can do better,” Smith said. “And that’s catching.”

STAKEHOLDER FEEDBACK. The game is a great tool not only to protect, enhance and restore the system for which it is played, but to give stakeholders perspective on the other players of the real-world game, Cousteau said. At the April event, stakeholders discussed their concerns as well as new understandings:

- Farmers expressed concern that others do not understand that although farming does pollute and cause part of the problem, it is a necessary part of the system, community and economy. As one long-time farmer said, “I’m willing to pay my fair share to help the Bay be healthy, but you have to understand that I’m only part of the system.”
- Watermen noted that the amount of pollution in the bay has a direct influence on how many crabs and oysters exist in the bay, the health of those animals, and how many watermen are allowed to catch.
- Environmentalists said the game gave them an important realization of what the others in the system have to deal with.

Along with these specific understandings, Cousteau said it is critical that everyone understand that everyone has to work together for a solution. “It is all part of a system, and it requires a balance, and it requires, in some cases, sacrifice by everyone.”

FUTURE USES. “We feel we are just at the beginning of creating this tool,” Plank said. “In principle, we could build the game for any watershed. We are interested in demonstrating that this can be done. We’re interested in the relationship of human behavior and interaction, and the impacts of those on a watershed.”

As a research vehicle, the simulated game provides a platform for testing of options, said William Sherman, associate professor of architecture. For example, if food safety is driving certain practices, a model

can be created to focus on the key decision factors and decision makers to determine the long-term results and implications of the decisions. The simulation could then be expanded to include other factors, such as if processors move to more environmentally sensitive methods, would they be able to stand up for the long term?

The advantage of the simulation is that stakeholders can try things out and determine results without having to take real-world chances in doing so. For example, a policymaker could run a simulation of a new policy, regulation or incentive to test its impact prior to real-world implementation. Or if a stakeholder, such as an environmentalist, felt a new regulation could be of benefit, that could be added to the game as well.

“We can take very specific questions and really get at why things happen in an industry,” Plank said.

WINNING TOGETHER. It is understanding those questions—why things happen and how we can work together to improve them—that was the reason for development of the game. And if results of and response from The Bay Games to date are an indication, the group seems to be achieving its objectives.

As one veteran waterman said to Cousteau at the conclusion of the April event, “I get it. I saw the ‘Aha’ moments on the faces of the kids, and I understand the balance that needs to occur, that isn’t occurring in the Chesapeake Bay.”

There aren’t enough collaborative dialogues happening now, the waterman said, so stakeholders aren’t realizing the need for everyone to work together toward the ultimate goal of sustainability of the ecosystem, and the existence of all its fruits that we enjoy.

“If the Chesapeake Bay collapses, nobody wins,” Cousteau said. “We need to have a long-term perspective, and we all need to engage in respectful dialogue. We need to understand that we’re all part of the problem and we can all be part of the solution.”

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