



Journey to Planet Earth

Transcript for Episode 16:

DISPATCHES FROM THE GULF 3

Ten Years After The Deepwater Horizon Oil Spill

Complete Version

Journey to Planet Earth is produced by

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MATT DAMON

We begin our story here, 700 miles south of New Orleans along the southern shores of the Gulf of Mexico.

***DISPATCHES FROM THE GULF 3
Ten Years After the Deepwater Horizon Oil Spill*****MATT DAMON**

This is the Mexican city of Campeche.

***Narrated By
Matt Damon*****MATT DAMON**

Though separated by language and distance, Campeche has much in common with a place like New Orleans. Both share a rich colonial heritage and as we will soon discover – they experienced a similar disaster.

***Dispatch #1:
A Tale of Two Spills*****MATT DAMON**

Founded over 400 hundred years ago by Spanish conquistadors – at Campeche's heart is a 17th century cathedral. This is part of a UNESCO World Heritage site and the center of the city's religious and cultural life. Yet beyond these ancient walls, there's a modern city with over 200,00 people – all with the same goal in mind – a better way of life.

For centuries, Campeche relied on the bounty of the Gulf as a major source of food as well as income. And local watermen still work a fleet of small fishing boats.

However, in 1979 their way of life almost disappeared. That's when an offshore oil well called Ixtoc exploded.

It took almost nine months before it was capped – but not before 140 million gallons of oil spewed into the Gulf of Mexico making Ixtoc the largest offshore oil spill in history.

The impact was immediate and traumatic.

More than four decades later, the fishermen of Campeche are still haunted by Ixtoc. They remember the closing of their fishery – of being forced into severe poverty – and the nightmare of watching friends and relatives simply give up, leave town, and never return.

Despite the disaster – drilling for oil off the Gulf coast of Mexico and the United States never stopped. And then the inevitable happened. Thirty-one years after Ixtoc and not all that far from New Orleans – history repeated itself.

Dispatch #2: The Deepwater Horizon Oil Spill

MATT DAMON

On April 20, 2010 the Deepwater Horizon oil rig blew-up. Over 200 million gallons of oil escaped into the Gulf for eighty-seven days. The event soon replaced Ixtoc as the largest offshore oil spill in history.

In an effort to breakup as much oil as possible, almost two million gallons of dispersants were sprayed onto the surface of the water and directly into the well-head. Even after a massive cleanup effort – oil slicks covered nearly 65,000 square miles – stretching from the salt marshes of central Louisiana, across Mississippi and Alabama, into the Florida panhandle.

The outcome mirrored what happened in Mexico after Ixtoc: coastal communities suffered greatly, especially from emotional and economic stress.

ROBERT CRAFT

Mayor – Gulf Shores, Alabama

All of our tourists left. Everybody evacuated – basically left – didn't want to be here. A lot of just unanswered questions created a lot of fear and concern.

THOMAS DARDAR, JR.

Principal Chief, United Houma Nation

The impact of the oil really was two-fold for our tribe, United Houma Nation. But just as our shrimpers were getting ready to go out, the oil spill happened and really closed the season. That hurt our economy real big for a long time.

DAVID CHAUVIN

Local Shrimper

It's just scary how one little pipe in the middle of the Gulf could change so many lives and rearrange things in a way that you could have never imagined.

MATT DAMON

Located in the heart of New Orleans' historic center is the P&J Oyster Company. Founded in 1876, this is the oldest continuously operating oyster business in the United States.

AL SUNSERI

P&J Oyster Company

We used to sell about 15 to 20,000 pounds of oysters in the shell a day that went to oyster bars in and around the country. And we don't do that anymore. We're trying to do our best to maintain our business and we don't want to see it go down under our tenure.

MATT DAMON

Also impacted, was the nearby, mostly African American fishing community of Pointe à la Hache. Byron Encalade is President of the Louisiana Oystermen Association.

BYRON ENCALADE

This community was dead – pushed into poverty like we have never saw before. What’s the road to recovery? Give us something. We need the facts, regardless of what it is. We need facts and we need good science.

MATT DAMON

The scientific response was almost immediate. Not long after the spill and restoration efforts, BP provided 500 million dollars over ten years for oil-related research. The first person they called was Rita Colwell, former Director of the National Science Foundation.

RITA COLWELL

I received a phone call asking me if I would consider being in charge of a program to do basic research on the spill. I agreed that it would be interesting to do this but I said, “look it really has to be independent, fully independent and it had to be modeled entirely like the National Science Foundation with respect to proposal submission, request for proposals.”

CHUCK WILSON**Chief Science Officer, GoMRI**

All the data that’s been collected will be available in perpetuity for people to draw on and compare it to a future study.

RITA COLWELL

So I agreed to form the Gulf of Mexico Research Initiative.

MATT DAMON

The initiative involved thousands of researchers from around the world working together on challenging issues in a wide range of scientific disciplines.

DAVID HOLLANDER**University of South Florida**

From a scientific point of view – this was an incredible opportunity to really understand how the ocean responds... how the system really functions.

CHENG LI**Johns Hopkins**

It’s composed of engineers. It’s composed of chemists, biologists.

HANK ASHBAUGH**Tulane University**

We all get to work on pieces of this very big puzzle.

STEVE MURAWSKI**University of South Florida**

We’re trying to see if we can come up with new, unique methods to understand the oil pollution process.

MANDY JOYE
University of Georgia

Every dive I've seen something new that I didn't know before. We discovered processes and organisms and microorganisms that are new to science.

JOSEPH KATZ
Johns Hopkins

In controlled experiments that we perform in the laboratory, we try to answer these questions.

DEAN GRUBBS
Florida State University

When I heard about the oil spill and I realized that the blowout occurred at 1500 meters deep, I knew that we didn't have any baseline data for the large fishes in that area.

MATT DAMON

From the beginning, the new initiative was destined to be one of the larger marine research studies in history.

CHUCK WILSON

There's a collection of science that's been funded that represent the various disciplines of oceanography. And they touch on –

Ecology
Physical Oceanography
Chemistry

CHUCK WILSON

– ecology, physical oceanography, and chemistry. And we have had a number of really interesting findings across all three of those disciplines.

Dispatch #3:
A Few Highlights of What Was Discovered

ECOLOGY

MATT DAMON

As first light touches the salt marshes and shallow waters of Louisiana's Barataria Bay, it becomes obvious that the bay is still a popular stopover for tens of millions of migratory waterfowl.

Its marshes and mangroves remain fertile nesting grounds and nurseries for birds and fish.

Though hit hard by the 2010 oil spill, these waters teem with hundreds of species of marine animals. This is also the permanent home for about 1,300 bottlenose dolphins.

A recent research study included a team of veterinarians, biologists and wildlife epidemiologists.

Though the acute health effects of the oil spill were over, their ultimate goal was to evaluate the long-term impact of Deepwater Horizon. Their first objective was to round up randomly selected dolphins.

It didn't take long before dolphins surrounded their boats. These were year-round residents who rarely left the bay. That's part of why they suffered during the 2010 oil spill.

Their feeding behavior was adapted to this specific area, so when the oil entered the bay they remained rather than move to safer but unfamiliar waters.

After surrounding the dolphins, experienced animal handlers jumped into the water, coaxed the animals towards the net and quickly got them into the hands of the veterinarians.

Each dolphin received a thorough examination. The goal was to discover any chronic health issues linked to oil exposure.

Because dolphins are mammals and breathe through their blowhole – monitoring their respiration helped the veterinarians decide whether their lungs were healthy or diseased.

After a brief dental examination, blood samples were drawn from tail fins to screen red and white blood cells and to check for any immune system abnormalities. Biopsies were also taken for indications of problems with their reproductive hormones and the presence of pollutants.

The samples were immediately brought to the team's floating laboratory. A team of biologists analyzed and processed them. At the end of the day the samples and collected data were sent to scientists around the country for further analysis.

During the research mission, the team examined 38 dolphins. Ultimately, they discovered that the dolphin population declined from 2,300 before the oil spill to 1,300 at the time of the study. Many of the surviving dolphins were underweight and in poor health.

But even more serious, their reproduction rate was low – 21% as opposed to the usual 65% in the wild.

Cynthia Smith, one of the lead scientists, is concerned about the future of the local dolphin population.

CYNTHIA SMITH

Trans-generational issues are still a big question and that is something we're worried about. Are these dolphins going to pass those issues on to their offspring?

MATT DAMON

Just a few miles from where the dolphins were examined, scientists from Louisiana State University were monitoring the condition of the marshes. Though they found that the grasses were recovering, they also discovered something unexpected that could shed light on the health of the Barataria dolphins.

EDWARD B. OVERTON
Louisiana State University

This area was covered with oil and now there's essentially not significant amounts of oil still left on the surface. However, recently we've discovered that a significant amount has been buried along the beach. It looks like some of the oil flowed down at low tide into crab burrows and stuck there.

And so our current effort is focused on trying to find the buried oil and how much is there. Once oil gets below the surface it stays down there. It doesn't get released all at once. It gets released a little bit at a time

MATT DAMON

And here's where things got a little complicated.

EDWARD B. OVERTON

At the edge of the marsh – what you're standing on now – is literally the nursery ground for the northern Gulf of Mexico fisheries. It's a protected area for small minnows and other little critters.

MATT DAMON

But these marshes are also a favorite feeding ground for the bottlenose dolphins of Barataria Bay. This raised the question, "Could the slowly leaking oil along the edge of the marshes be a clue in the mystery of their failing reproductive health?"

CYNTHIA SMITH
National Marine Mammal Foundation

This story is going to play out for many years and it will take constant monitoring of these populations to really understand what was the long term impact of the spill on dolphins living in the Gulf.

MATT DAMON

Dolphins are not the only animals affected by the oil spill.

Dean Grubbs is an expert on the ecology of sharks. He and his team from Florida State University spent many months gathering post-Deepwater Horizon information.

DEAN GRUBBS

When everyone realized that the spill occurred at about 5,000 feet deep, the first question folks started asking was, "What lives down there, what organisms, what communities are actually being affected by this oil right now?"

MATT DAMON

After spending two hours putting out miles of baited hooks, the team was ready to pull them in.

DEAN GRUBBS

Fish on.

Whenever we get a fish on, we'll ID the fish. It'll get a specimen number. From there – if it's a shark – then it will get its temperature taken and blood sample by Bianca for stress physiology work. And then it will get measured and weighed.

TEAM MEMBER 1

96...

DEAN GRUBBS

John will take the liver and bile. Those are all the samples that will go for the toxicology work. It's a pretty streamlined process.

The ironic thing is we actually tried to get funding to do this exact kind of work to get base line data in preparation for a spill three years prior to the spill. There was no interest. And so we were behind the curve when the spill happened.

MATT DAMON

John Whalen is a PhD student.

JOHN WHALEN

I'm going to look at molecules in their liver that increase in concentration after exposure to pollutants such as oil-related products.

MATT DAMON

Bianca Prohaska is a PhD candidate studying biology.

BIANCA PROHASKA

I take the whole blood and I spin it down in the centrifuge. And then I'm able to get the plasma, which separates from the red blood cells. And that's what I'm going to look at and see what reproductive condition fish are in.

MATT DAMON

What happened next tested the team's endurance and strength.

DEAN GRUBBS

We got a big fish. Got a big fish. Got a big six-gill shark coming.

MATT DAMON

Everyone rushed to the stern. It's extremely rare to see a live six-gilled shark.

DEAN GRUBBS

I bet she's a thousand pounds at least.

We're going to test that winch.

She's almost too big for the stretcher.

MATT DAMON

This is one of the world's largest sharks and its appearance is similar to fossil sharks dating back roughly 200 million years.

DEAN GRUBBS

Go out with A-frame just a little bit for me.

Think that'll hold?

Okay, now up. Real slow. Real slow. Keep coming up. Gotta do this fast guys. Okay, hold it! Hold it!

One, two, three. There we go. Now, we're talking.

All right: measurement.

A lot of people think about the dangers of dealing with these sharks and there are certainly dangers.

[Talking to team member.] Joe, the caudal fin has been bitten.

A rolling boat – rough seas – your working with scalpels and hypodermic needles taking blood samples and bile samples.

Working on a deck of a research ship can be quite dangerous.

We try to get her in within about two to three minutes, but they're pretty tough animals.

All right. Let's get her over board.

MATT DAMON

The team was now in a race to get the shark back in the water – alive.

DEAN GRUBBS

Out with the A-frame. Go ahead and let her down a bit. Yeah, just about. Down.

Okay, hold what you got.

Look at her, she's gonna swim right off.

Hoo, hoo!

MATT DAMON

During their research cruise, Dean Grubbs and his crew endured harsh weather conditions – lack of sleep – and backbreaking work. Their goal was to determine the impact of the Deepwater Horizon spill on sharks. Dean Grubbs is cautiously optimistic about their future.

DEAN GRUBBS

This has become the largest survey of deep water sharks ever conducted. What we've seen is that the toxicological effects of the oil actually kept ramping up for two and a half or three years after the spill and then started coming back down.

I'm cautiously optimistic that the effects of the spill were relatively short-lived and moderate. But these animals grow so slowly – they reproduce slowly – so it takes a long time for these effects to work their way up the food chain to these really slow growing animals. And I think it'll take at least ten more years before we're able to see if they're recovering.

MATT DAMON

Just a few miles from the site of the spill, Mandy Joye and her team from the University of Georgia conducted numerous experiments as well. Their specialty is studying the environment of the most remote and deepest parts of the Gulf of Mexico – places where oil seeps naturally from vast pools of petroleum locked deep beneath the sea floor.

MANDY JOYE

I'm a microbial geochemist. That means that I study microorganisms, the little tiny organisms that you need a microscope to visualize.

You can think of them as these little microbial worker bees that live in the ocean and they carry out critical processes that make the ocean function and keep the ocean healthy.

MATT DAMON

Over the years, Joye has visited numerous sites where animals adapted to an oily existence – places where microscopic organisms eat tiny droplets of oil.

MANDY JOYE

These natural seeps are incredibly diverse and teeming with life.

MATT DAMON

But ever since Deepwater Horizon, she's experienced very few "teeming with life" moments.

MANDY JOYE

It's a lot of dead worms and debris from the water column.

MATT DAMON

Numerous times during her research, Joye used a manned submersible to explore the bottom of the Gulf. Often to locations over 5,000 feet deep and just two miles from the site of the oil spill. It took Dr. Joye about one and half hours to reach the bottom.

Once there, she had an unparalleled look at the ocean floor.

It wasn't a pretty sight.

When the submarine's ultraviolet camera was turned on – wherever there was oil, the sediment fluoresced an eerie green.

MANDY JOYE

The bad “aha moment” was when we really started looking hard at some of the animals. We saw oiled and dead corals. We saw oiled and dead sea fans. All the filter-feeding organisms were clearly impacted by the sedimented oil.

A sea fan that's a few feet tall can be five hundred years old and happily surviving and is now covered in brown slime and is dead.

These organisms who filter feed and who are not selective filters – feeders. They're not gonna spit the oil out. They're gonna just filter whatever comes past them. They're being damaged.

MATT DAMON

The dive to the bottom of the Gulf confirmed the team's worst fears. They found oil – and lots of it. Despite her discovery, Joye is hopeful.

MANDY JOYE

I think in many aspects, the Gulf is certainly resilient and it has responded incredibly to this very, very large and significant perturbation. But I do believe that there are things that we don't know the answer to yet.

PHYSICAL OCEANOGRAPHY**MATT DAMON**

As newer technologies continue to evolve, collaboration between academic, government, and industry scientists is even more important.

This was particularly evident when another research team launched an innovative and complex experiment.

Their goal was to use enhanced equipment designed to predict where the wind, waves, and currents of the Gulf would take surface oil after a major blowout.

ERIC D'ASARO
University of Washington

Knowing where it goes is a big deal cause if you don't know where the oil is going to go then it's hard to prepare people and set up the cleanup, things like that.

MATT DAMON

The team deployed a new generation of a device called a "drifter." A mechanism that floats with ocean currents while transmitting data like location, speed, and water temperature.

ERIC D'ASARO

First drifter deployment now.

HELGA HUNTLEY

And go.

MATT DAMON

During the month-long cruise – despite harsh weather – over a thousand drifters were deployed.

ERIC D'ASARO

Okay. Deploy drifter number two.

[Indistinct chatter.]

ERIC D'ASARO

We're throwing out drifters. So it's going well. We just gotta keep going. It's a marathon, not a race.

MATT DAMON

Assisted by a wide variety of communication and data gathering tools, it was an experiment on a scale never done before.

HELGA HUNTLEY
University of Delaware

I'm keeping track of when they're throwing the drifters in the water.

[Indistinct chatter.]

I put down the drifter number, the way point number, the time we dropped it, and the GPS location so that we have some record as to when the drifters were launched.

And go.

TEAM MEMBER 2

Two, two, two.

[Indistinct chatter.]

ERIC D'ASARO

All right. Last one.

MATT DAMON

The initial results were stunning real-time visualizations of oceans currents that will ultimately lead to computer models that will help predict the movement of oil during future spills.

It is one of the most remarkable collaborations in the history of marine science.

CHUCK WILSON

Although the glamorous part of research and what looks good in a movie is: operations on a boat – or setting a long line and seeing a big shark come up – or seeing people in a fast moving vessel. But a major part – in fact – probably 80% of the work is done in the laboratory where it can be repeated, which is really the essence of science.

CHEMISTRY**MATT DAMON**

This is the still beating heart of a fish isolated from its body. Though it may look like science fiction, this is actually cutting edge research.

GEORGINA COX**University of Miami**

What we've done is we've removed the heart from the animal and cannulated the inputs to the heart and the outputs of the heart.

What's going into the heart right now is physiological saline. This simulates the blood that's in the fish. So, basically the heart doesn't know that it's out of the animal.

We expose fish to concentrations of oil that were actually measured in the Gulf of Mexico during the spill and then measure cardiovascular function.

We've shown that cardiovascular function is compromised due to oil exposure.

MARTIN GROSELL**University of Miami**

Without this complete understanding, we do not truly know what are the most sensitive indicators of impact by an oil explosion.

RITA COLWELL

We've also learned about how oil, when under high pressure as it would be in the deep parts of the Gulf, explodes into the water column... how the bubbles of oil disperse when it comes to the surface... how the aerosol reaches shore.

MATT DAMON

But it was the use of dispersants to ease the impact of the oil spill that challenged research scientists. Especially after catching the attention of the news media.

FEMALE REPORTER #1

Little is known about the affects of these chemicals applied in such great amounts.

FEMALE ANCHOR #2

Deadly mix. Did the chemicals used to break-up that oil in the Gulf do more harm than good?

CHUCK WILSON

There's still some debate about using dispersants – the jury is still out.

We have uncovered a number of “good news / bad news” stories that in some cases dispersants helped and in other cases they hindered the process of degradation of oil.

MATT DAMON

The good news came from scientists at Johns Hopkins University, who developed a way to actually observe dispersants interacting with oil.

The team built a 20-foot wave tank that allowed them to photograph how naturally breaking waves split oil slicks into small droplets.

But when dispersants were added, high-speed cameras captured a remarkable event.

The oil broke up into microscopic droplets, which greatly reduced the adverse effects of the oil. However, for the cleanup crews who worked the oil soaked beaches – there was some not so good news.

KIRSTEN KOEHLER**Johns Hopkins**

A lot of what we're thinking about is, “How can oil spill materials become small particles that can travel through the atmosphere to impact first responders?”

My first thought was, “Well, there's oil spills quite frequently, I'm sure a lot is already known.” And when I started looking into it, I was shocked to find out that actually very little is known.

MATT DAMON

That's when Ramana Sidhaye was asked to join the team.

RAMANA SIDHAYE

As a pulmonary and critical care physician, I study lung diseases.

So we designed a chamber that would allow for exposure of human lung cells to what occurs in the areas of oil spills. So that we can actually see what happens to the cells during and after an exposure.

KIRSTEN KOEHLER

What we find is when dispersants are used, there is a change in the aerosol size that could affect air quality both in the immediate vicinity of the spill, but also potentially be transported long distances. So as particle size gets smaller, those particles have the ability to penetrate more deeply into the respiratory system where they may cause more severe adverse health outcomes.

MATT DAMON

Unfortunately, smaller aerosol sizes also brought some bad news.

KIRSTEN KOEHLER

More sophisticated respiratory protection is required, for example, for cleanup workers who may be in close proximity to oil particles.

CHUCK WILSON

The decision to use dispersants was made at a very critical time and my personal opinion is the decision at that time was the best based on available information.

The next time a deep-water blow out occurs they will have new information that will better inform that decision.

MATT DAMON

In the laboratory, data is often the key to discovery. And as the team at Johns Hopkins University continued to gather public health information, another mystery unfolded, and it was in one of the most isolated places on Earth.

The Gulf of Mexico contains a deep ocean galaxy of tiny animals – some no bigger than a pinhead. Creatures like bacteria, algae, and jellyfish. It's a dazzling display of nature that exists in nearly every ocean of the world.

And then there's a phenomenon called marine snow when these creatures join with other small particles – like plants and animal wastes – to form sticky flakes slowly drifting downward through the water column.

As it descends to the ocean's floor, the marine snow picks up additional particles and grows larger until it becomes a major food source for animals – particularly for those living in the deep ocean. But what does this have to do with the Deepwater Horizon oil spill?

In 2010, while millions of gallons of oil poured into the Gulf, something very unexpected happened.

Wherever the currents took the oil, gently falling marine snow suddenly turned into a blizzard as it mixed with oil and dispersants.

Left behind was an area of oiled sediments, about the size of Delaware, covering the floor of the Gulf of Mexico.

Research scientists at Texas A&M University in Galveston investigated the interaction between marine snow, oil, and dispersants.

UTA PASSOW

University of California – Santa Barbara

Marine snow is really important because it's the only way food gets transported to the deep ocean. Plants can only grow at the surface of the ocean because only there is some light. And the other animals – living deeper down where it's dark – rely on this marine snow to bring food down to them.

ANTONIETTA QUIGG

Texas A&M University at Galveston

It's really important in helping us to understand why we saw so much more marine snow formed after the spill; something that we haven't seen with other spill events that have occurred around the world.

MATT DAMON

Like most scientific studies, there are rarely quick or easy answers.

Finding the precise link between marine snow, oil, and dispersants and its impact on the environment requires continued research and collaboration.

So, as the tenth anniversary of Deepwater Horizon approaches, a fundamental question still lingers.

Dispatch #4:

The Current State of the Gulf of Mexico

CHUCK WILSON

The most common question is, "Has the Gulf of Mexico recovered from the oil spill?" And the response is – well it depends on what part you're talking about.

Certainly the ocean has proven again to be a very forgiving entity but we really aren't clear on what the long-term impacts are going to be.

RITA COLWELL

We have learned that the fisheries indeed are safe. That is the concentrations of oil in the fish that are now being harvested for market or consumption are safe.

We find that the ecology is resuming to what it would be a pre-spill state. So, it's not a matter of the sky is falling. Not at all.

MANDY JOYE

It's certainly doing better than a lot of people thought it would be doing. But there are still areas that are heavily impacted like deep-water corals on the sea floor.

Those slow growing communities – they would not recover from this incident for hundreds of years.

CJ BEEGLE-KRAUSE
SINTEF

What we can do is look at the recovery of beaches and marshes. What's going to completely go back to being in a pristine state and what is going to be in a new state afterwards.

DAVID HOLLANDER

Some sites are coming back but still there are a significant number of sites that have not returned nearly to the position that we had hoped they would be at this point.

CYNTHIA SMITH

Since 2010, there have been multiple studies on dolphins and dolphin health – in Barataria bay in particular. And now we have to keep a close eye on those animals looking for evidence of recovery because it could be decades until we get back to where we were before. And we may never get back to where we were before.

CHUCK WILSON

There is still some debate about where the oil went, but the models that have been most recently run show that some of the oil was consumed by bacteria and reduced down to carbon dioxide. Some of the oil ended up in the marshes where it's still located today. There is a fairly significant amount of oil that's imbedded in the sediment out in deep water.

CJ BEEGLE-KRAUSE

What we see in many spills is that eventually the environment recovers. Whether it's to the original state or to a slightly altered state depends on the spill.

I don't think ten years after we will have the full information of what has changed during the Deep Water Horizon.

MATT DAMON

A major strategy that led to hundreds of post-oil spill discoveries was a collaborative approach to research.

CHUCK WILSON

One of the greatest accomplishments is over 1,500 graduate students that will go on to be the next generation of scientists that will understand what collaborative research is all about.

Dispatch #5:
A Legacy of Collaboration

TRACEY SUTTON
Nova Southeastern University

The people – that's probably the main thing we've developed that we didn't have before. Kind of a collaborative synergy such that a new generation of scientists now realizes the value of collaboration across a range of topics. They might ask questions we never thought to ask.

RYAN RODGERS
Florida State University

Collaboration forces people to get out of their comfort zones and ask the question, “Then what?” and “Then what?” and “Then what?” So you arrive, hopefully, at a train of experiments and personnel that in the end answers a much larger question than any one person can.

MANDY JOYE

Collaboration is going to springboard discovery across disciplines. I mean that doesn’t have a five- or 10-year life cycle. That has a 50-year life cycle. And it’s going to go long past GoMRI because those students will have students, will have students.

HELGA HUNTLEY

I don’t think that I will lose touch with the vast majority of my colleagues who have worked with me.

Even if we don’t necessarily pursue joint projects we will continue to be aware of each other’s work and continue to influence each other’s research directions.

BRIAN HAUS
University of Miami

It really is – I think – a model for going forward, of how big investments can be made and should serve as an inspiration for what can be done from those investments... what can be achieved.

MATT DAMON

The path to a scientific breakthrough is paved with both failure and dogged determination.

A scientist observes... backtracks... and reexamines.

If you try to understand the thought process and relentless determination that goes into this pursuit of knowledge, with that usually comes empathy.

And as we will soon see, empathy these days is in short supply.

Dispatch #6:
Science Is A Way Of Knowing

RITA COLWELL

Science is a way of knowing. It’s an accumulation of solid information of data and then making sense of those data.

Whether it’s working on a ship, or in a laboratory with a very expensive elaborate piece of equipment that measures very interesting things to very, very small accurate points.

CYNTHIA SMITH

I think we all feel a huge sense of obligation to make sure that we are coming with open minds and we're coming with a lot of energy to really focus and that the scientific community continues to strive to get it right.

KAREN MALONE**Hamburg University of Technology**

I don't know about obligations, but what we try to do in science is to foster a better understanding of processes that affect us every day.

VILLY KOURAFALOU**University of Miami**

A lot of people do not understand that pretty much everything that they use and they value in everyday life has been initiated from what we call basic science rather than applied science.

So investment in science in any community, in any country, in any group, and altogether globally, is crucial for survival.

RITA COLWELL

When one puts together the information that's been gathered, a hypothesis that had been formulated and tested and the results published, you always know that someone is going to test your hypothesis.

MATT DAMON

Testing a scientific hypothesis is one thing, but scientists are now facing a serious and growing disconnect from politicians and the public.

***Dispatch #7:
Skepticism – Criticism – Trust*****CYNTHIA SMITH**

It's pretty baffling to me as a scientist to see how much skepticism there is today about science that applies to our environment and the way we should be taking care of animals and the planet.

SCOTT PRUITT

I believe the ability to measure with precision the degree of human activities impact on the climate is subject to more debate.

JIM IMHOFF

I ask the Chair, do you know what this is? It's a snowball.

HELGA HUNTLEY

When I have conversations with people who don't believe as strongly as I do that science should be a fundamental basis for good decisions, I try to explain where we are coming from. I try to explain what the scientific method consists of; that we are aiming to be as unbiased as we possibly can.

MANDY JOYE

I think that if people really understood how passionate we are about learning, it would be a game changer. And would sort of just absolutely eliminate the argument that – you know – scientists are working on climate change so that they can get research grants and become rich, because you don't become rich as a scientist. You know, I don't know any rich scientists.

SUNSHINE VAN BAEL**Tulane University**

The way to deal with the issues of skepticism in science is to start young.

So, I do a lot of outreach with elementary school children to get them excited about current issues in the environment.

CHUCK WILSON

It was very important that our science reach that community. And so that's how you deal with skeptics is you continue to tell them what you are learning and translate it in a way that it's comprehensible to them.

RITA COLWELL

By the very nature of doing science, ethically, you provide accuracy. You provide a very responsible presentation of your results. And I think that is how the scientific method works.

DAVID HOLLANDER

It's not dumbing down the situation, but giving the people – the skeptics – a representation that they have familiarity with. And that's really perhaps our Trump card, no pun intended.

MATT DAMON

Communicating with science skeptics is clearly a daunting challenge. Perhaps there is much to learn from how female scientists cope with a different, but equally insidious hurdle.

Dispatch #8:***For Women, A Lot Has Changed*****MARGARET LEINEN****Director, Scripps Institution of Oceanography**

When I started, there were restrictions about going to sea. There were restrictions about a lot of things associated with graduate school and about oceanography.

Fortunately a lot of that has changed. It doesn't mean that things are totally easy. I think that we still struggle to deal with how best to encourage young women to go into science. How best to make it easy for them to have families and to be in science.

VILLY KOURAFALOU

One issue is that a lot of times women – and let’s say minorities for the lack of another word – they do not have the same opportunities. They do not have the same networks. They do not receive the same mentoring.

HELGA HUNTLEY

Where I have seen the challenges more is trying to break into these networks that are really “old boys” networks where men are dominating the conversation.

MARGARET LEINEN

The demographics are changing. They change every year, but we’re still not at a point in most fields of science where it’s 50-50 men and women.

CARL SAGAN

How did the universe arise?

MARGARET LEINEN

If you grow up and you never see a woman scientist on television – or you never see one in the movies – or you never hear about one, it’s not something that you start thinking about as a direction for you to go.

VILLY KOURAFALOU

It’s not easy. We have to be inclusive. We have to educate ourselves, everybody, and recognize that it is crucial for any society, not for science only – for society in general – to give the same opportunities for everyone because these individual successes are crucial for the success of the whole.

MATT DAMON

Though the Gulf of Mexico Research Initiative has funded one of the larger research collaborations in the history of marine science, its 500 million dollar commitment is drawing to a close. Simply put, many scientists are worried about the future.

Dispatch #9:***Where Will New Funding Come From?*****STEVE SEMPIER****Mississippi-Alabama Sea Grant Consortium**

You know, there will be a void after a \$500 million, 10-year investment and then suddenly that is no longer available to the research and outreach community.

RACHAEL HEUER

Scientists really need access to funding in order to perform their research. As an early career scientist, it is something that concerns me moving further into the ranks of academia

MANDY JOYE

The work is important. And the work of other scientists is important. And we can't just throw up our hands and give up and walk away. Or move to France; or move to Germany.

KIRSTEN KOEHLER

The money that goes into research is recuperated through a lot of the advancements in technology that end up bringing back tax dollars to the U.S. economy.

MANDY JOYE

I want the U.S. to be leading the charge for solving global problems. And to do that requires an investment. It's an investment for our grandchildren.

RITA COLWELL

The most important lesson that comes from the Gulf of Mexico Research Initiative is that it has proven to be an enormously successful collaboration between industry, academia, the government, and non-governmental organizations. This provides a model for the future: when funds become reduced from the federal government or from the state governments, it is a way to mobilize society constructively to address a very important societal problem.

MATT DAMON

This presents an urgency to find new sources of funding so scientists can continue to discover ways to adapt to or mitigate the impact of future oil explorations.

Remarkably, one of GoMRI's final research projects predicted the impacts of future oil spills by looking back in time.

***Dispatch #10:
The Past is the Key to the Future***

***ALONG THE GULF COAST OF MEXICO –
NOT FAR FROM CAMPECHE***

MATT DAMON

We have finally come full circle. Almost 40 years after Ixtoc – scientists returned to Mexico – to a remote mangrove forest that was once covered with Ixtoc oil.

DAVID HOLLANDER

It gets into a pretty wet area, so you may sink in a bit.

MATT DAMON

Fieldwork is never easy, but this location was almost impossible. The temperature was well over 100 degrees Fahrenheit.

PATRICK SCHWING
University of South Florida

One of our main goals is to try and apply what we're learning here in the southern Gulf of Mexico to what the Deepwater Horizon sites in the northern Gulf may look like in 35 years.

So, we're sampling saltwater ponds. We're sampling surface layers of oil. We'll take several short sediment cores to get a good idea of how that oil has weathered to determine long-term impacts of the oil – how the oil has degraded – is the degraded oil as toxic as it was. So it will be very applicable to our research in the northern Gulf of Mexico following the Deepwater Horizon.

DAVID HOLLANDER

If that's what it is, no one can be sure until we make the measurements.

We don't want to speculate too hard, but it looks as though that there's some obviously growth pattern changes and then it seems to resume itself. So, we'll see in the laboratory. What we're going to do now is store this in a straw. And because these cores are very fragile, this is the best way to make sure they're preserved.

ISABEL ROMERO
University of South Florida

This is oil. And the way that we know that it's oil is because I put my nose in there. This smells like oil. Who wants to smell it?

DAVID HOLLANDER

Let me have a sniff.

ISABEL ROMERO

So we will go to our lab at the University of South Florida and we will start analyzing the samples.

MATT DAMON

That included checking if remnants of oil were still toxic as well as how long it took for the ecosystem to fully recover from the impact of the Ixtoc spill.

DAVID HOLLANDER

What we saw in the southern Gulf of Mexico was that most sites returned between seven and 10 years. So it takes about a decade for the system to purge itself, clean itself, and restore itself.

We are only six to seven years into the northern Gulf of Mexico studies and indeed we've seen some sites come back, but clearly not all of them.

And what is another difficult thing to understand is that the community that actually is coming back to the northern Gulf of Mexico was not the community that was there before the blow out.

The community returns but it doesn't restore itself to the exact position ecologically or physiologically as one predicted. It actually is an evolution in the ecology to another stable state.

The next blowout – not where it will occur, but it will occur – the scientists at that time are going to provide an incredible insight into how they're going to deal with the disaster – which as we know it's across all seven ocean basins, whether it's in Africa or South America, Australia, the Indo Asian continent.

So I think we've played a really important role in terms of the legacy that a bad situation allows us to really provide insights that will help for those that are going to be impacted by the next bad event.

Dispatch #11: Final Thoughts

MATT DAMON

Clearly we are living in a time when drilling for oil can lead to economic and environmental challenges – a time when science skepticism and inequitable rights of women have become major news stories. However, we are also living in an era that has the potential to bring great positive change in how we treat our planet.

CHUCK WILSON

I'd like to think that my grandchildren will be joining an era of less dependence on hydrocarbon-based fossil fuels for power. I'd like to think that we'll have better solar, better wind, better hydro plants.

I'd like to think that the work that we're doing will lay the groundwork to be more diligent at protecting our ocean environment.

RITA COLWELL

This will come from science, engineering, technology, and the application of theories, mathematical analysis of big data. We'll learn new patterns of discovery and we will in fact be operating in an entirely new basis of energy that drives the societal businesses and engines of the future.

MATT DAMON

This presents politicians, industry leaders, and the scientific community with an enormous challenge: the need to work together to strike a balance between developing new sources of energy and relying on what nature can safely provide.

Though separated by distance and culture – for the nearly 8 billion people who draw sustenance from the resources of the world – there are common bonds – bonds that are renewed by each generation – bringing new ideas – new attitudes – new hope.

Planet Earth – this is our home – this is where our journey of discovery must begin.

UNDERWRITING NARRATOR

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