



1
00:00:07,500 --> 00:00:10,950

[Music]

2
00:00:16,630 --> 00:00:13,749

my land covered career really started in

3
00:00:18,470 --> 00:00:16,640

2002 with biggest wildfire in oregon's

4
00:00:21,750 --> 00:00:18,480

history and that was the biscuit

5
00:00:24,630 --> 00:00:21,760

wildfire i at the time was doing botany

6
00:00:26,710 --> 00:00:24,640

surveys and looking for rare plants or

7
00:00:29,189 --> 00:00:26,720

rare mushrooms and so i was spending a

8
00:00:31,910 --> 00:00:29,199

lot of time out on the on the forest

9
00:00:33,830 --> 00:00:31,920

looking at and taking photos and doing

10
00:00:36,150 --> 00:00:33,840

the documentation that a scientist or

11
00:00:37,110 --> 00:00:36,160

land manager does when that fire

12
00:00:39,510 --> 00:00:37,120

happened

13
00:00:42,150 --> 00:00:39,520

it changed everything because we all had

14

00:00:44,069 --> 00:00:42,160

to react to this fire that was burning

15

00:00:46,310 --> 00:00:44,079

up some of the places that i'd literally

16

00:00:48,150 --> 00:00:46,320

been the day before

17

00:00:50,549 --> 00:00:48,160

and it was mapping what was there and

18

00:00:52,790 --> 00:00:50,559

what was under threat but it was also

19

00:00:55,590 --> 00:00:52,800

mapping the effects of the fire we

20

00:00:57,830 --> 00:00:55,600

needed to find a way to look across 500

21

00:01:00,150 --> 00:00:57,840

000 acres and the only way that we could

22

00:01:02,549 --> 00:01:00,160

really do that was satellite data

23

00:01:05,350 --> 00:01:02,559

if we can't get out and actually measure

24

00:01:07,270 --> 00:01:05,360

every single thing what are we missing

25

00:01:08,950 --> 00:01:07,280

and that's where citizen scientists can

26

00:01:10,950 --> 00:01:08,960

actually come in and really help

27

00:01:13,910 --> 00:01:10,960

traditional scientists to better

28

00:01:18,149 --> 00:01:13,920

understand what is happening around them

29

00:01:21,910 --> 00:01:19,990

the global learning and observations to

30

00:01:23,429 --> 00:01:21,920

benefit the environment program is an

31

00:01:24,550 --> 00:01:23,439

international science and education

32

00:01:26,390 --> 00:01:24,560

program

33

00:01:28,310 --> 00:01:26,400

it provides students and the public with

34

00:01:31,590 --> 00:01:28,320

the opportunity to participate in data

35

00:01:33,510 --> 00:01:31,600

collection and the scientific process

36

00:01:35,030 --> 00:01:33,520

the globe observer app is one of these

37

00:01:36,789 --> 00:01:35,040

opportunities allowing citizen

38

00:01:38,630 --> 00:01:36,799

scientists and students to take land

39

00:01:42,870 --> 00:01:38,640

cover observations around the world and

40

00:01:48,149 --> 00:01:46,310

but what exactly is land cover

41

00:01:50,069 --> 00:01:48,159

dr eric brown to colston of nasa's

42

00:01:52,069 --> 00:01:50,079

goddard space flight center explains

43

00:01:54,789 --> 00:01:52,079

land cover is really the basic form of

44

00:01:59,030 --> 00:01:54,799

the landscape that we have around us

45

00:02:00,709 --> 00:01:59,040

so whether it's a forest or a desert

46

00:02:02,469 --> 00:02:00,719

but it's really one of the components of

47

00:02:04,709 --> 00:02:02,479

the landscape that we can study from

48

00:02:06,630 --> 00:02:04,719

space

49

00:02:09,270 --> 00:02:06,640

peter nelson is a scientist who uses

50

00:02:11,750 --> 00:02:09,280

land cover imagery in his research i am

51
00:02:14,949 --> 00:02:11,760
a remote sensing scientist who studies

52
00:02:18,150 --> 00:02:14,959
land cover across the globe

53
00:02:20,869 --> 00:02:18,160
i use satellite imagery to make maps of

54
00:02:23,030 --> 00:02:20,879
land cover and try to quantify what

55
00:02:25,350 --> 00:02:23,040
covers the earth

56
00:02:27,430 --> 00:02:25,360
sometimes the satellite can't see what's

57
00:02:29,750 --> 00:02:27,440
happening underneath a tree canopy or

58
00:02:31,670 --> 00:02:29,760
what's happening underneath cloud cover

59
00:02:33,589 --> 00:02:31,680
and so we really need people to go out

60
00:02:36,229 --> 00:02:33,599
there and to take these photos to do

61
00:02:37,990 --> 00:02:36,239
these observations to help fill in where

62
00:02:40,229 --> 00:02:38,000
a satellite can't actually make some

63
00:02:42,470 --> 00:02:40,239

observations just like any digital

64
00:02:44,229 --> 00:02:42,480
photograph land cover images are made up

65
00:02:46,710 --> 00:02:44,239
of a series of pixels to show what

66
00:02:48,309 --> 00:02:46,720
covers the earth a pixel or picture

67
00:02:50,390 --> 00:02:48,319
elements is the smallest unit of a

68
00:02:52,309 --> 00:02:50,400
digital image when combined with

69
00:02:54,229 --> 00:02:52,319
thousands of other pixels

70
00:02:56,470 --> 00:02:54,239
a picture is formed

71
00:02:57,830 --> 00:02:56,480
each pixel color shown represents a land

72
00:02:59,589 --> 00:02:57,840
cover type

73
00:03:01,509 --> 00:02:59,599
it's from these pixels where ground

74
00:03:03,350 --> 00:03:01,519
verification or ground truthing come

75
00:03:05,589 --> 00:03:03,360
into play

76

00:03:07,910 --> 00:03:05,599

you see depending on what satellite is

77

00:03:11,670 --> 00:03:07,920

taking images a pixel can cover roughly

78

00:03:13,670 --> 00:03:11,680

an area 30 to 500 meters squared

79

00:03:15,750 --> 00:03:13,680

for imagery captured by landsat a pixel

80

00:03:18,630 --> 00:03:15,760

is 30 meters squared or about the size

81

00:03:21,190 --> 00:03:18,640

of a baseball diamond

82

00:03:25,910 --> 00:03:21,200

however part of the pixel showing forest

83

00:03:30,149 --> 00:03:28,229

by taking land cover observations

84

00:03:31,750 --> 00:03:30,159

citizen scientists can help answer these

85

00:03:33,670 --> 00:03:31,760

questions when it comes to land cover

86

00:03:36,070 --> 00:03:33,680

maps

87

00:03:38,789 --> 00:03:36,080

so why are these land cover observations

88

00:03:38,799 --> 00:03:42,789

why are they taken in the first place

89

00:03:47,190 --> 00:03:44,630

we also are looking at how these

90

00:03:49,830 --> 00:03:47,200

components are changing over time so

91

00:03:53,030 --> 00:03:49,840

deforestation in the amazon or across

92

00:03:55,110 --> 00:03:53,040

the world our city is expanding

93

00:03:56,869 --> 00:03:55,120

a lot of different things to study and

94

00:03:59,670 --> 00:03:56,879

and really the view from space is the

95

00:04:02,550 --> 00:03:59,680

way that we do it here in nasa we have

96

00:04:04,710 --> 00:04:02,560

big supercomputers that simulate

97

00:04:06,789 --> 00:04:04,720

the physics of the atmosphere and the

98

00:04:08,390 --> 00:04:06,799

land the interaction between the earth's

99

00:04:10,550 --> 00:04:08,400

systems

100

00:04:13,350 --> 00:04:10,560

it's important to have that

101
00:04:15,190 --> 00:04:13,360
you know the that land cover map it sets

102
00:04:17,189 --> 00:04:15,200
certain parameters

103
00:04:18,229 --> 00:04:17,199
those models can actually be used to

104
00:04:20,629 --> 00:04:18,239
look at

105
00:04:23,030 --> 00:04:20,639
current day conditions and weather so

106
00:04:24,150 --> 00:04:23,040
based on these current conditions

107
00:04:25,830 --> 00:04:24,160
what might

108
00:04:28,629 --> 00:04:25,840
the earth look like

109
00:04:30,790 --> 00:04:28,639
50 or 100 years from now

110
00:04:32,629 --> 00:04:30,800
there's an element of

111
00:04:35,030 --> 00:04:32,639
understanding

112
00:04:36,550 --> 00:04:35,040
but then also being able to predict

113
00:04:38,790 --> 00:04:36,560

into the future

114

00:04:41,510 --> 00:04:38,800

you know what that might be like what

115

00:04:43,350 --> 00:04:41,520

what these changes may mean for us

116

00:04:44,870 --> 00:04:43,360

each point shown here represents a real

117

00:04:46,390 --> 00:04:44,880

world measurement of environmental

118

00:04:47,990 --> 00:04:46,400

conditions

119

00:04:49,670 --> 00:04:48,000

scientists use computer models to fill

120

00:04:51,189 --> 00:04:49,680

in information where measurements may

121

00:04:53,189 --> 00:04:51,199

not exist

122

00:04:55,110 --> 00:04:53,199

by verifying the satellite imagery and

123

00:04:56,710 --> 00:04:55,120

using the data for these models

124

00:04:59,189 --> 00:04:56,720

scientists can predict changes in our

125

00:05:00,870 --> 00:04:59,199

environment more accurately

126
00:05:02,710 --> 00:05:00,880
one of these scientists using land cover

127
00:05:04,790 --> 00:05:02,720
maps to track urbanization as part of

128
00:05:06,710 --> 00:05:04,800
her work is dr amita mehta of nasa's

129
00:05:10,310 --> 00:05:06,720
goddard space flight center

130
00:05:12,870 --> 00:05:10,320
so urbanization changes terrain as well

131
00:05:16,230 --> 00:05:12,880
as characteristics of the surface itself

132
00:05:18,790 --> 00:05:16,240
and so impervious surface is what we

133
00:05:20,469 --> 00:05:18,800
look at when we are monitoring flooding

134
00:05:22,310 --> 00:05:20,479
when there are say parking lots or

135
00:05:24,870 --> 00:05:22,320
cement and concrete surfaces they

136
00:05:26,469 --> 00:05:24,880
increase so previously if it was a

137
00:05:28,310 --> 00:05:26,479
farmland or

138
00:05:30,550 --> 00:05:28,320

something which was not built

139

00:05:33,189 --> 00:05:30,560

and if that is built now

140

00:05:36,310 --> 00:05:33,199

that water previously that could go or

141

00:05:38,950 --> 00:05:36,320

percolate in the soil and in the

142

00:05:40,469 --> 00:05:38,960

ground now cannot go in and it stays

143

00:05:43,430 --> 00:05:40,479

there

144

00:05:44,710 --> 00:05:43,440

monitoring helps you to plan for it

145

00:05:47,110 --> 00:05:44,720

if you see

146

00:05:48,710 --> 00:05:47,120

land cover changing even then you know

147

00:05:51,590 --> 00:05:48,720

that you know how water is going to flow

148

00:05:55,029 --> 00:05:51,600

in that region might change if you have

149

00:05:58,230 --> 00:05:55,039

to send rescue out or to plan for relief

150

00:05:59,510 --> 00:05:58,240

activities then if you know land cover

151

00:06:02,550 --> 00:05:59,520

then you know

152

00:06:04,710 --> 00:06:02,560

where there might be help needed

153

00:06:06,790 --> 00:06:04,720

by using land cover maps and models that

154

00:06:08,309 --> 00:06:06,800

reflect changes over time

155

00:06:13,749 --> 00:06:08,319

scientists can predict where flooding

156

00:06:17,270 --> 00:06:15,670

with a changing climate these

157

00:06:19,029 --> 00:06:17,280

predictions from models and land cover

158

00:06:21,029 --> 00:06:19,039

maps can help scientists better

159

00:06:24,150 --> 00:06:21,039

understand these changes and help

160

00:06:26,550 --> 00:06:24,160

communities prepare for them

161

00:06:29,430 --> 00:06:26,560

but perhaps a more important reason as

162

00:06:31,510 --> 00:06:29,440

to why take land cover observations is

163

00:06:33,909 --> 00:06:31,520

you get to participate in a community of

164

00:06:35,749 --> 00:06:33,919

scientists citizen scientists and

165

00:06:38,230 --> 00:06:35,759

students

166

00:06:40,070 --> 00:06:38,240

so it's a very important component that

167

00:06:42,469 --> 00:06:40,080

the citizen science and students of the

168

00:06:43,749 --> 00:06:42,479

globe program and globe observer can

169

00:06:46,070 --> 00:06:43,759

contribute to

170

00:06:47,990 --> 00:06:46,080

is by really giving us

171

00:06:49,189 --> 00:06:48,000

the information on the ground of what

172

00:06:51,430 --> 00:06:49,199

they're seeing

173

00:06:53,830 --> 00:06:51,440

around them and in front of them and we

174

00:06:55,909 --> 00:06:53,840

hope over time as well how maybe some of

175

00:06:58,710 --> 00:06:55,919

these things are changing because those

176

00:07:02,309 --> 00:06:58,720

would be very valuable for science

177

00:07:04,790 --> 00:07:02,319

i saw the value of having information

178

00:07:06,790 --> 00:07:04,800

before a hazard happens because once

179

00:07:09,909 --> 00:07:06,800

that fire went through an area we could

180

00:07:11,830 --> 00:07:09,919

never recreate that data

181

00:07:14,150 --> 00:07:11,840

this is all important for us to share

182

00:07:16,390 --> 00:07:14,160

and put together because that's how we

183

00:07:19,029 --> 00:07:16,400

understand earth as a system

184

00:07:21,909 --> 00:07:19,039

all of these things end up affecting

185

00:07:23,990 --> 00:07:21,919

where we live why we live where we do

186

00:07:26,150 --> 00:07:24,000

and why we make some of the choices that

187

00:07:28,150 --> 00:07:26,160

we do

188

00:07:31,029 --> 00:07:28,160

to learn more about globe observer check

189

00:07:32,469 --> 00:07:31,039

out the website at observer.globe.gov

190

00:07:34,650 --> 00:07:32,479

and download the app to start taking