



SPACE  
STATION  
STORIES

1  
00:00:00,506 --> 00:00:05,546  
[ Music ]

2  
00:00:06,046 --> 00:00:08,526  
>> It's a big, beautiful  
blue planet,

3  
00:00:08,786 --> 00:00:13,266  
and adventurous natives  
have been exploring it all

4  
00:00:13,516 --> 00:00:18,486  
over from the very beginning.

5  
00:00:18,486 --> 00:00:20,886  
Lately, they've been  
exploring off the planet,

6  
00:00:20,886 --> 00:00:23,116  
determined to discover  
what's out there.

7  
00:00:23,596 --> 00:00:25,656  
But as luck would  
have it, their pursuit

8  
00:00:25,656 --> 00:00:28,416  
of their future has also  
been building their present.

9  
00:00:29,306 --> 00:00:32,546  
They're enjoying benefits today  
that are coming out of the work

10  
00:00:32,546 --> 00:00:36,586  
about tomorrow, work that's  
being done right now aboard the

11  
00:00:36,586 --> 00:00:38,106

International Space Station.

12

00:00:39,516 --> 00:00:51,516

[ Music ]

13

00:00:52,516 --> 00:00:54,866

[ Inaudible ]

14

00:00:55,366 --> 00:00:58,916

Since Expedition 1 arrived  
on orbit in the year 2000,

15

00:00:59,256 --> 00:01:02,456

there have been more than  
1,500 investigations active

16

00:01:02,456 --> 00:01:04,146

on the International  
Space Station

17

00:01:04,596 --> 00:01:05,786

in fields like medicine--

18

00:01:05,786 --> 00:01:11,616

>> Medicine, protein crystal  
growth, combustion, metallurgy,

19

00:01:11,666 --> 00:01:15,886

basic science, space  
science, Earth observation

20

00:01:15,886 --> 00:01:19,516

for disaster recovery  
and relief.

21

00:01:19,916 --> 00:01:21,496

>> And many of those experiments

22

00:01:21,496 --> 00:01:23,816

and research projects  
have produced beyond the

23

00:01:23,816 --> 00:01:24,836  
original intent.

24

00:01:25,466 --> 00:01:28,666  
For example, a lot of the  
work in medicine was designed

25

00:01:28,666 --> 00:01:32,046  
to keep astronauts safe in  
space, such as research on how

26

00:01:32,046 --> 00:01:34,796  
to keep crew members from losing  
bone mass and weightlessness.

27

00:01:34,796 --> 00:01:38,256  
And the researchers found that  
nutrition was playing a part.

28

00:01:38,256 --> 00:01:41,016  
>> Individuals that  
had more iron storage

29

00:01:41,016 --> 00:01:43,876  
in their body had  
more oxidative damage

30

00:01:43,976 --> 00:01:47,796  
and had more bone loss  
in certain regions.

31

00:01:47,846 --> 00:01:50,416  
>> So more attention was  
paid to providing foods

32

00:01:50,416 --> 00:01:53,016  
with the right kinds of

minerals and nutrients.

33

00:01:53,086 --> 00:01:55,116

Then there was better  
exercise support,

34

00:01:55,656 --> 00:01:58,796

like an upgraded exercise device  
that proved its effectiveness

35

00:01:58,796 --> 00:02:03,336

in crew members who flew with it  
after having flown without it.

36

00:02:03,336 --> 00:02:07,506

>> For the first flight, I  
lost nine percent of bone loss.

37

00:02:07,926 --> 00:02:11,476

After the second flight  
doing those prescriptions

38

00:02:11,476 --> 00:02:15,406

and exercises I,  
I've been told to do,

39

00:02:15,906 --> 00:02:20,166

from bone loss perspective,  
I lost nothing.

40

00:02:20,606 --> 00:02:23,536

>> The right combination  
of exercise and diet

41

00:02:23,536 --> 00:02:27,686

and Vitamin D supplements  
meant no bone loss.

42

00:02:27,686 --> 00:02:30,356

>> So there's been a huge

development of our understanding

43

00:02:30,356 --> 00:02:33,306  
of bone processes, why  
astronauts are losing bone,

44

00:02:33,306 --> 00:02:36,196  
and how the bone remodels  
and recycles itself.

45

00:02:36,616 --> 00:02:39,556  
Understanding that process  
helps us protect astronauts,

46

00:02:39,556 --> 00:02:42,696  
but it also has the benefit  
of giving new insights

47

00:02:42,696 --> 00:02:44,776  
into understanding those  
same processes on Earth

48

00:02:44,866 --> 00:02:48,086  
where so many people are  
worried about bone loss.

49

00:02:48,176 --> 00:02:51,276  
>> Another example of station  
research providing a benefit

50

00:02:51,276 --> 00:02:53,476  
on the ground --  
water reclamation.

51

00:02:54,206 --> 00:02:57,646  
Early on, the station crew  
members relied on space shuttles

52

00:02:57,646 --> 00:03:00,246  
and other cargo ships

to deliver fresh water,

53

00:03:00,246 --> 00:03:04,616  
but the long range plan was for  
a more self-sufficient station

54

00:03:05,086 --> 00:03:06,986  
with a system that  
turns wastewater

55

00:03:07,316 --> 00:03:08,736  
into pure drinking water.

56

00:03:09,386 --> 00:03:10,346  
>> Onboard the space station,

57

00:03:10,346 --> 00:03:14,336  
we've had a water recovery  
system in use since 2008.

58

00:03:14,766 --> 00:03:17,586  
This system recovers  
90% of the water

59

00:03:17,806 --> 00:03:19,296  
that we fly to the  
space station.

60

00:03:19,496 --> 00:03:22,966  
This technology will be vital  
for our long duration missions

61

00:03:23,206 --> 00:03:25,406  
and that's because on  
the deep space mission,

62

00:03:25,756 --> 00:03:27,276  
the water resupply  
won't be practical.

63

00:03:27,926 --> 00:03:30,076

>> And where else do you think this technology is

64

00:03:30,146 --> 00:03:30,936

proving useful?

65

00:03:31,546 --> 00:03:33,576

>> The water treatment system that we developed

66

00:03:33,576 --> 00:03:35,536

for the space station is, has been deployed

67

00:03:35,536 --> 00:03:37,626

over the last ten years now all over the world.

68

00:03:38,586 --> 00:03:41,556

>> When you get involved with a plant of this kind,

69

00:03:41,826 --> 00:03:44,746

if it is well-used, it can change the lives

70

00:03:44,746 --> 00:03:46,726

of an entire community.

71

00:03:46,956 --> 00:03:49,726

It gives you children that learn more.

72

00:03:50,266 --> 00:03:53,096

It gives you parents who spend less money on medicine.

73

00:03:53,656 --> 00:03:54,866

It changes the future.

74

00:03:55,436 --> 00:03:58,096

>> And then there's  
space station activity

75

00:03:58,096 --> 00:04:00,516

that was designed to  
benefit people on Earth.

76

00:04:01,236 --> 00:04:03,316

For example, students on Earth,

77

00:04:03,316 --> 00:04:05,956

from grade schoolers  
through postdocs.

78

00:04:05,956 --> 00:04:09,586

Since the beginning, station  
crew members have used an

79

00:04:09,586 --> 00:04:12,686

amateur radio to talk directly  
with students on the ground,

80

00:04:13,106 --> 00:04:15,396

answering questions and  
inspiring some of them

81

00:04:15,636 --> 00:04:17,866

to careers in science,  
technology,

82

00:04:17,956 --> 00:04:19,606

engineering, and math fields.

83

00:04:20,846 --> 00:04:23,016

More than half a million  
students have learned

84

00:04:23,016 --> 00:04:26,456  
about geography and  
teamwork and communications

85

00:04:26,816 --> 00:04:30,306  
and problem-solving by  
participating in an experiment

86

00:04:30,406 --> 00:04:33,546  
that lets them control a camera  
on the station and aim it

87

00:04:33,546 --> 00:04:35,826  
at targets on the Earth  
of their own choosing.

88

00:04:37,796 --> 00:04:39,906  
The spheres experiments  
originated

89

00:04:40,026 --> 00:04:42,856  
to test algorithms related  
to formation flying,

90

00:04:43,446 --> 00:04:46,386  
but it's evolved to include  
students in the design

91

00:04:46,496 --> 00:04:48,806  
and execution of  
those robotic fights.

92

00:04:49,316 --> 00:04:53,046  
The International Space  
Station has a lot of goals.

93

00:04:53,716 --> 00:04:56,886  
Not only is it getting people  
of this planet to work together

94

00:04:57,566 --> 00:05:00,186

and enabling deep space  
missions of the future

95

00:05:00,986 --> 00:05:03,646

and seeding the growth of  
commercial space ventures.

96

00:05:05,036 --> 00:05:08,016

It has an ambitious agenda  
of laboratory science

97

00:05:08,166 --> 00:05:11,896

and technology research that's  
using the unique environment

98

00:05:11,896 --> 00:05:15,246

of low Earth orbit to learn  
what can't be learned here