

Beyond GDP: Measuring Genuine Progress

Moderator: Rob Moore – Scioto Analysis

Speakers: Eli Lazarus – University of California, Berkeley Regina Ostergaard-Klem – Hawai'i Pacific University ASSOCIATION FOR PUBLIC POLICY ANA & MANAGEMENT

Webinar





Moderator: **Rob Moore**



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ASSOCIATION FOR PUBLIC POLICY ANALYSIS & MANAGEMENT



Measuring Genuine Progress

Rob Moore | Scioto Analysis









Scioto Analysis Economics | Public Policy

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Double Counting Informal economy Hidden costs



: What is GPI?

Measure created to improve GDP GDP = C + I + G + NX GPI = Economic + Environmental + Social



: Economic

Adjusted Personal Consumption
Cost of Consumer Durables
Value of Consumer Durables
Cost of Underemployment
Net Capital Investment

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Environmental

. Cost of Water Pollution Cost of Air Pollution Cost of Noise Pollution Loss of Wetlands Loss of Farmland, Soil Quality, or Degradation CO_2 Emissions Cost of Ozone Depletion **Depletion of Non-Renewables**

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Lost of Primary Forest and Damage from Logging Roads

: Social • Value of Housework and Parenting Cost of Family Changes Cost of Crime Cost of Household Pollution Abatement . Value of Volunteer Work Loss of Leisure Time . Value of Higher Education . Value of Highways and Streets Cost of Commuting Cost of Auto Crashes cioto Analysis Economics | Public Policy



GPI Act of 2021 Introduced in July 2021 by Rep. Ilhan Omar (D-MN)

 Directs the Secretary of Commerce to establish GPI as an alternative metric for measuring the net benefits of economic activity

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Genuine Progress Indicator: Data and methods Acknowledgement and thanks to: Professor Clair Brown and UC Berkeley undergraduate research assistants Ji Hun (Grace) Yeo, Evan Yoshimoto, Robert Hou, Emaan Siddique, Joshua Kim, Rupsha Debnath, Sanya Sethi, and Matthew Mabie for their work on the project. National Science Foundation for support through the Graduate Research Fellowship Program under Grant No. DGE 1752814.



Δ	A		A	A	A	Δ	A	A	Δ	A
					÷		-			
2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016

Eli Lazarus

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GPI Components

Gross Market Components

Personal Consumption Cost of Inequality Net Services of Consumer Durables Net Capital Investment

Value of Housework Cost of Commuting Value of Transportation Infrastructure Value of Volunteer Work Costs of Crime Costs of Vehicle Accidents Loss of Leisure Time Value of Healthcare Value of Education Cost of Underemployment

Social Components

Environmental Components Cost of Farmland Changes Cost of Forest Changes Cost of Air Pollution **Cost of Water Pollution** Cost of Noise Pollution Cost of Household Pollution Abatement Cost of Wetland Changes **Depletion of Non-Renewable** Resources Cost of Ozone Depletion Cost of Climate Change



Method example 1: Value of Volunteer Work

Year	2010	2011	2012	2013	2014
Per Capita Value of Volunteer Work	\$ 1,209	\$ 1,178	\$ 1,012	\$ 1,104	\$ 1,067
Value per hour per year per capita					
Quantity Data Source: BLS Time Use Survey					
Valuation Source: BLS, Occupation Employment Statis 0000 http://www.bls.gov/oes/2011/mav/oes_ca.htm#00	stics. Hourly wage	rate average fo	or all occupations http)://www.bls.gov/	oes/tables.htm#
Assumptions: Volunteer work valued at average wage					
Data Source: BLS, Occupation Employment Statistics	. Hourly wage rate	average for all	occupations http://ww	ww.bls.gov/oes/	tables.htm#00-0
US Av hourly wage (2011 US\$)	\$ 22.02	\$ 21.74	\$ 21.56	\$ 21.56	\$ 21.58
Data Source: BLS Time Use Survey, accessed throug SOCIAL_VOL (weighted average [by given WT06 weighted average [by given WT06	h IPUMS ATUS htt ghts] per year and	ps://www.atusda multiplied by 36	ata.org/atus-action/tir 65)	ne_use_variabl	es/group/3 for B
Annual Volunteer Hours per capita	\$ 54.91	\$ 54.17	\$ 46.95	\$ 51.19	\$ 49.45



Method example 2: Cost of Air Pollution

Year	2014
Per Capita Cost of Air Pollution	\$ -657
Cost per ton per year per capita	
Total Cost of Air Pollutants (2011 US\$)	\$ 209,443,797,852
NOX Cost annual	\$ 14,313,932,882
SOX Cost annual	\$ 28,811,835,729
PM10 Cost annual	\$ 24,482,585,136
PM2.5 Cost annual	\$ 86,774,910,409
VOC Cost annual	\$ 55,060,533,695
Data Source: https://www.epa.gov/air-emissions-inventories/air-pol trends-data	lutant-emissions-

Assumptions: SO2 costs = SOX	costs, note that EPA data	a is in "short/U.S. tones"
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Air Pollutants Estimated Total (1000 tons)	123,247
TOG	
ROG	
СО	65,537
NOX	12,589
SO2	4,674
PM10	18,183
PM2.5	5,381
VOC	16,883

Valuation: Marginal damage values: Table 1 from 2012 corrigendum paper multiplied by Factor (2014 total/2011 total) to account for method update in 2014, using 2011 bc there is no total in 2012 or 2009. (Muller, Nicholas Z, and Robert Mendelsohn. 2012. "Efficient Pollution Regulation: Getting the Prices Right: Corrigendum (Mortality Rate Update)." American Economic Review 102 (1): 613–16. https://doi.org/10.1257/aer.102.1.613. Muller, N. Z. 2014. "Boosting GDP Growth by Accounting for the Environment." Science 345 (6199): 873–74. https://doi.org/10.1126/science.1253506. Muller, Nicholas Z, Robert Mendelsohn, and William Nordhaus. 2011. "Environmental Accounting for Pollution in the United States Economy." American Economic Review 101 (5): 1649–75. https://doi.org/10.1257/aer.101.5.1649.

Assumptions: Email correspondence with Muller supports that factor multiplication to update for the methodology change in going from age-varying VSL to consistent VSL (and \$6million VSL, US\$2005, and other lower impact changes). The marginal value in the table are associated with a total damages estimate of \$184 Billion in \$US2000 for 2002, but in the corrgendum and later work the total is reported as \$478 Billion in \$US2005 for 2002. So the multiplication factor is broadly accounting for the change in the total, applied to the reported marginal values.





Value of Volunteer Work & **Costs of Air Pollution: US and CA**

US GPI components



CA GPI components



Gross Domestic Product and Genuine Progress Indicator United States of America California





– Financial

-Social

Genuine Progress Indicator: Data and methods Acknowledgement and thanks to: Professor Clair Brown and UC Berkeley undergraduate research assistants Ji Hun (Grace) Yeo, Evan Yoshimoto, Robert Hou, Emaan Siddique, Joshua Kim, Rupsha Debnath, Sanya Sethi, and Matthew Mabie for their work on the project. National Science Foundation for support through the Graduate Research Fellowship Program under Grant No. DGE 1752814.



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\downarrow GDP/ GNP

Gross Domestic Product/ Gross National Product

MEW

Measure of Economic Welfare

Nordhaus, William, and James Tobin. 1972. Economic Growth: Is Growth Obsolete? National Bureau of Economic Research

Index of Sustainable Economic Welfare

 \rightarrow ISEW

Daly, Herman E., John B. Cobb, and Clifford W. Cobb. 1989. For the Common Good: Redirecting the Economy toward Community, the Environment, and a Sustainable Future. Boston: Beacon Press.



GDW History

GPI

Genuine Progress Indicator Cobb, C.W., T Halstead, and J Rowe. 1995. "The

Genuine Progress Indicator: Summary of Data and Methodology." Redefining Progress.

Years included in Study

The Genuine Progress Indicator: Hawai'i GPI 2.0

APPAM Webinar March 2, 2022 Regina Ostergaard-Klem, PhD Hawai'i Pacific University



EA O KA 'AINP



The Roots of GPI in Hawai'i





Environmental Country Attached to Department of Health State of Howall 2015-2016 Annual Report Per HIS Section 343 6 January 21, 2017

2014

ENVIRONMENTAL COUNCIL ANNUAL REPORT STATE OF HAWAI'I



Components of Hawai 'i GPI 2.0

Utility from consumption of market based goods and services

- Consumption exp (+PCE)
- Defensive and regrettable expenditures (-DEFR)
- Household invest (-HI)
- Consumer durable • expenditures (-CDE)
- Inequality (-INQ)

- Services human & built capital (+KH, +KB)
- Services of consumer durables (+CDS)
- Services from protected • areas (+KN)
- Public/non-profit provision of goods and services (+PP)

Utility derived from services of essential capital

Disutility associated with undesirable conditions, trends, and externalities

- Local and global pollution costs (-POL)
- Depletion of natural capital (-DKN)
- Social costs (-SC)

Total & per capita GPI & GDP



Hawai'i GPI 2.0 (as of 2/28/22)

Hawai'i GPI 2.0 (as of 2/28/22)



GPI indicators (bar graph)



Hawai'i GPI 2.0 (as of 2/28/22)

"How to" for GPI...

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Table 4. Factors we used to compare and evaluate a narrow versus a broad approach.

	"As is"	Strengths	Weaknesses	Modified	Supplemental indicators
Narrow (Fisher) Benefits and Costs Experienced	Talberth & Weisdorf (2017) OR Van der Slycken & Bleys (2020) narrow only	+Approach comparable to published studies; seems to be the way GPI 2.0 is going +Meets "all citizens thriving" goal +Most similar to GDP	 -Leaves out transboundary, intergenerational aspects -Does not meet many of the goals set out -Could be misleading, as externalized costs ignored -Cannot be used for ex ante policy analysis 	 -Update Talberth & Weisdorf with insights from Van der Slycken & Bleys to make it more consistent with theory -Change framings and valuations for key social components (e.g., unpaid care and household work) -Change valuation for natural capital to be consistent with Fisher's theory (TBD) 	-Add metrics of pollution relevant in HI
Broad (Hicks) Benefits and Costs of Economic Activity	Van der Slycken & Bleys (2020) broad	+More holistic survey of the costs of economic growth +Meets "good global citizens" and "good ancestors" goals by including transboundary and future costs +Useful for ex ante policy analysis	-Much broader/less comparable to GDP -New study, yet to be fully vetted by GPI2.0 community -May not be the path other GPI studies will go, which would undermine comparability		- Add natural capital relevant to Hawai'i (value of both services and depletion) -Expand list of services from social capital

Evaluate the Models

Build the Structure

Table 5. Method confidence (M) and data availability (D) for each indicator in both Talberth & Weisdorf (2017) and Van der Slycken & Bleys (2020) approaches.

Indicator	МD	Indicator	м	D	Indicator	М	D
Market-based goods and services					Local pollution costs		
Consumption Expenditure		Legend:			Air		
Public & Non-profit provision		Known method/data in hand			Water		
Defensive/Regrettable Expenditure	25	Developing methods/data availa	able	,	Noise		
Food and alcohol		Method/data uncertain			Solid waste		
Tobacco and Narcotics		Method/data problematic/unavailab	le		Cost of extreme weather events		
Insurance and Financial Services					Nitrogen		
Cost of Road Acoldents					Global environmental and social	005	ts
HH pollution abatement					Climate damages due to emissions		
Medical and legal services					Climate damages due to trade		
Food Waste		Services from social/human capit	tai		Pollution damages due to trade		
Energy waste		College Graduates			Social costs embodied in trade		
Alimony and Child Support		Manufacturing Jobs			Depletion of natural capital		
Lotteries		Green Jobs			Non-renewable energy		
HH investments		Unpaid Work			Groundwater		
Household repairs/ maintenance and home improvement		Loisure			Soll erosion		
Higher and Vocational Education		Internet			Land/benthos conversion		
Savings, Investment, Retirement		Cultural practices			Fisheries		
Charitable Giving		Services built capital			Social costs		
Consumer Durable Expenditures		Transportation			Homelessness		
Clothing & Footwear		Weter Infrastructure			Underomployment		
Appliances & Furnishings		Household Improvements			Commuting		
Vehicles		Services of Consumer Durables			Crime		
Cost of Income Inequality		Services protected areas			Family Breakdown		
Non-defensive Government Expenditures		Terrestrial and marine			Lost Leisure Time		
Net capital growth		Cultural Sites			Vehicle Crashes		



UTILITY FROM MARKET-BASED CONSUMPTIONS

1. Personal Consumption Expenditure (+PCE)

Household/individual annual consumption, the base for which GPI adjustments are made.

+PCE = Hawaii Personal Consumption Expenditures/CPI-U

2. Defensive and Regrettable Expenditures (-DEFR)

Welfare harmful or welfare neutral expenditures to be deducted from Personal Consumption Expenditure (PCE).

Food, alcohol and tobacco (Welfare neutral goods) Insurance and financial services HH pollution abatement (air, wastewater, solid waste) Medical and legal services Food waste Energy waste Alimony and child support Lotteries

-DEFR = Costs of food & alcohol + tobacco + insurance & financial services + HH pollution abatement + medical & legal services + food waste + energy waste + alimony & child support

3. Household Investments (-HI)

Portions of consumption that are investments; to be deducted from Personal Consumption Expenditure (PCE).

Household repairs/maintenance and home improvement Savings, investment, retirement Charitable giving Higher and vocational education

-HI = Household repairs/maintenance & home improvement + Savings, investment, & retirement + Charitable giving + Higher & vocational education

4. Consumer Durable Expenditures (-CDE)

Expenditure costs of consumer durables, including clothing, footwear, furnishings, household equipment, and vehicle purchases. To be deducted from Personal Consumption Expenditure (PCE).

Consumer durables Appliances & furnishings Vehicles

-CDE = Consumer Durables Expenditure in Hawaii* CPI-U

1.through 4. represent adjusted PCE

5. Cost of Income Inequality (-INQ)

Adjustment for the diminishing utility of income.

-INQ adjustment = (Adjusted PCE = PCE-DEFR-HI-CDE)*(1-DMUI) where a diminishing marginal utility of income ratio (DMUI) reduces the welfare from income above a certain threshold

6. Public and Non-Profit Provision of Goods and Services (+PP)

The annual value of non-defensive goods and services consumed by households/individuals but produced by public or non-profit entities.

Hawaii share of federal government non-defense spending, based on population

- Hawaii share of State & Local based on population
- Hawaii NPISH from BEA Regional Dataset

+PP = Hawaiii share of federal government non-defense based on population + Hawaii share of state & local based on population + Hawaii NPISH from BEA regional dataset

UTILITY DERIVED FROM SERVICES OF ESSENTIAL CAPITAL

7. Services from Social and Human Capital (+KS/KH)

Services from investments in human capital are accounted for by estimating social payoffs.

College Graduates Manufacturing Jobs Green Jobs Unpaid Work Leisure Internet

> +KS/KH = Value from College Graduates + Manufacturing Jobs + Green Jobs + Unpaid Work + Leisure + Internet

8. Services of Built Capital (+KB)

Services from investments in built capital are accounted for by estimating social payoffs. Net stocks are valued at a rate representing annual depreciation + interest.

Transportation/Highways & Streets Water Infrastructure Household Improvements

+KB = Value of transportation/highways & streets + water infrastructure + household improvements + services from consumer durables

9. Consumer Durables Services (+CDS)

Consumer Durables provide services beyond the initial year of purchase. Net stocks are valued at a rate representing annual depreciation + interest.

-CDE = Value of services from consumer durable stock

10. Services from Protected Areas (+KN)

Natural capital assets provide ecosystem services that enhance utility, some of which can be directly linked to economic activity and investments. Values by land cover derived from a global database.

+KN = total developed urban blue/green infrastructure + total cultivated land + total grassland + total tropical forest + total shrub/scrub + total palustrine wetlands + total wetlands/shore + total desert + total open water

DISUTILITY ASSOCIATED WITH UNDESIRABLE CONDITIONS, TRENDS, AND EXTERNALITIES

11. Local Pollution Costs (-POL)

Local pollution costs associated with economic activity are deducted because they are not welfare enhancing.

Air Water Noise Solid waste Greenhouse gas/Climate damages due to emissions

-POL = Costs for air + greenhouse gases + water + noise + solid waste

12. Depletion of Natural Capital (-DNK)

Depletion impacts current utility and affects future welfare).

Non-renewable energy Groundwater Soil erosion Land conversion

-DNK = Costs of non-renewable energy + groundwater + soil erosion +land conversion

13. Social Costs (-SC)

Social costs of economic activity reduce overall welfare; some of these may already be accounted for in defensive expenditures.

Houselessness Underemployment Crime Vehicle Crashes Commuting

> -SC = Costs of houselessness + underemployment + crime + vehicle crashes +commuting

DEFENSIVE & REGRETTING	LE EXPENDITURES (-DEFR)																						
Description: Welfare harm	ful or weithre neutral expe	enditures to be deducted from Co	nsumption Expenditue	re (C).																			
Methodology: All or portio	ons of the below defensive	and regrettable expenditures cat	egories are identified	and subtracted fro	n C																		
Calculation: -DIFR = Contro	of food & alcohol + tobacc	ca + insurance & financial service	s+HH pollution abate	ment + medical & i	egal services + too	d waste + energy wa	de + almony & ch	ki support															
BEA SAPCES:																							
Sub Indicator	News Available	Links	300	2001	2001	1003	2004	1001	2006	3000	10.5	2003	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Food & Alcahol	2000-2020	2020 USD, Billions	1.356	1.360	1.364	1.385	1.448	1.511	1.554	1,590	1.582	1.640	1.656	1.687	1.686	1.709	1.720	1.758	1.782	1.924	1.864	1.919	1.875
Tobacco	2008-2020	2020 USD, Billions	0.588	0.578	0.563	0.539	0.550	0.556	0.572	0.574	0.561	0.652	0.662	0.619	0.578	0.561	0.539	0.551	0.967	0.574	0.578	0.568	0.579
Insurance & Financial Serv	ice 2000-2020	2020 USD, Billions	3.408	3.281	3.311	3.467	2.676	3.906	4.074	4.218	4.126	3.900	4.055	4.067	2.964	4.007	4.171	4.385	4.423	4.655	4.885	4.856	4.808
HH Pollution Absternent	2000-2020	2020 USD, 985ors	0.2892	0.3931	0.3809	0.3789	0.3961	0.3937	0.4049	0.4207	0.4429	0.4821	0.5015	0.5004	0.5426	0.5653	0.5636	0.5524	0.5704	0.5657	0.5809	0.5769	0.5816
Medical (Legal Uronalishie	#1 2000-2020	2020 USD, Billions	7.550	7.490	7.765	8.133	8.462	8.904	9.142	9.425	9.627	10.092	10.075	10.122	10.264	10.450	33.818	11.449	11.761	11.953	12.327	12.857	12311
Food Waste	2000-2020	2020 USD, Billions	1.089	1.094	1.085	1.112	1.170	1.218	1,245	1.367	1.266	1.301	1.315	1344	1.353	1.377	1.389	1425	1.465	1.496	1.536	1.558	1.422
Energy Waste	2000-2020	2020 USD, Billions	0.087	0.099	0.093	0.093	0.500	0.117	8.127	0.130	0.131	0.132	0.145	0.546	0.153	0.144	0.545	0.126	0.112	0.112	0.120	0.119	0.123
Almony & Child Support	Unavailable BEA	2020 USD, 9/6ont																					
Lotteries	2000-2020	2020 USD, Billions	0.662	0.681	0.669	0.697	0.721	0.733	0.750	0.742	0.759	0.778	0.811	0.877	0.993	0.928	0.960	0.967	0.922	0.979	0.902	0.880	0.544
DEFR TOTAL (NEA)	2000.000	2020 USD, Billions	94,730	14.941	15.231	25.805	55.494	17.239	17.870	18.258	18.516	18.973	19,215	19.321	19.414	19.761	30.305	25,224	21.962	22.049	22.774	22.228	22.243

Populate the Structure (-DEFR) Defensive & Regrettable Expenditures

F

Sector Se	

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COLUMN DE LE CAL	R. Contraction of the second se																						
Description: h	ion-market unpaid work, including volunteer work, hour	ework, and caregiving provide	e beneficial social se	vices that are not i	accounted for in PC	E or GDR																	
Methodology	cincludes non-market time from solunteering, housewor	k, and caregiving. Applies stat	ndard GPI approach	based on American	Time Use Survey (ATUS data on hour	s spent on each nor	-market labour cat	regory multiplied by	the market cost of	lubritutable poid!	abor.											
Calculation: V	talue of unpaid work in Hawaiin (time spent on housewor	k + time spent on caregiving)	+ hourly wage for h	outerkeepers/dear	ers + time spent vo	dunteering * dollar	value of volunteer e	rork .															
Line Hain	Variable												2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	202
N 8 - 11 173	1 National Average Hours Spent on Housework	Hours per bay	1.81	1.81	1.81	1.83	1.81	1.83	1.79	1.64	1.73	1.8	1.79	1.77	1.74	1.78	1.77	3.84	1.82	1.81	1.78	1.78	1.7
	2 National Average Hours Spent on Caregiving Nonhous	ets Hours per Day	0.26	0.25	0.25	0.25	0.27	0.24	0.21	0.2	0.23	0.21	0.21	0.21	0.18	0.19	0.18	0.29	0.21	0.18	0.31	0.19	0.1
	3 Sure of National Average Hours Spent on Caregising +	Ho Hours per Day	2.67	2.06	2.06	2.11	2.08	2.67	2	2.04	1.96	2.01	2	1.98	1.92	1.97	1.95	2.69	2.09	1.99	1.99	1.97	1.5
	4 Annual Hours Spert on Caregising + Housework	Annual Hours per Person	754.88	752.81	750.35	770.15	759.20	755.55	730.00	744.60	715.40	733.65	730.00	722.70	700.80	719.05	711.75	740.95	740.95	726.85	726.35	719.05	713.5
	5 Hawaii Median Haurly Wage For Housekeepers & Clea	ne Current USD	11.53	11.79	12.04	11.9	12.14	12.37	12.69	13.36	13.99	14.48	14.69	15.29	15.36	15.63	15.96	17.07	17.88	18.67	18.59	19.11	29.3
6	 Hawaii Population Over 15 	Persons	967,657	940,882	994,688	1,006,257	1,025,997	1,045,998	1,063,453	1,070,274	1,082,849	1,095,864	1,111,413	1,123,599	1,136,135	1,147,500	1,153,928	1,161,000	1,367,229	1,165,413	1,163,649	1,162,382	1,156,83
	 Hawaii Population under 5 	Persons	78,087.00	77,624.00	78,444.00	79,522.00	81,912.00	83,121.00	84,376.00	86,092.00	87,854.00	\$7,\$77.00	87,775.00	90,162.00	91,536.00	92,478.00	99, 169.00	93,658.00	92,634.00	90,756.00	88,735.00	85,220.00	94,040.0
-	c. Hawaii Population ages 5-9	Persons	84,497.00	\$2,554.00	90,570.00	78,766.00	77,684.00	76,612.00	36,190.00	76,473.00	77,674.00	81,222.00	88,258.00	83,850.00	85,362.00	86, 547.00	85,606.00	85,649.00	95,574.00	87,670,00	87,523.00	88,018.00	87,555.4
6	 Hawaii Population ages 10-14 	Persons	82,278.00	\$4,878.00	85,911.00	86,609.00	\$8,085.00	86,968.00	85,712.00	82,836.00	\$2,836.00	81,754.00	81,517.00	\$1,718.00	81,771.00	82,118.00	\$1,896.00	\$1,745.00	81,122.00	81,154.00	80,686.00	79,252.00	78,574.6
	7 Value of Housework per person per year	Current USD	\$8,709.76	\$8,875.66	\$9,038.98	\$9,164.79	\$9,216.69	\$9,270.60	\$9,253.70	\$9,947.86	\$9,996.91	\$10,623.25	\$10,723.70	\$11,050.08	\$10,764.29	\$11,228.75	\$11,359.52	\$12,648.02	\$13,248.19	\$13,560.95	\$13,502.85	\$13,341.05	\$13,785.7
8	a. Value of Housework in Hawaii	Current USD, Billions	\$8.42	\$8.71	99.99	\$9.22	\$9.46	\$8.70	\$9.85	\$30.65	\$10.77	\$11.64	\$11.92	\$12.42	\$12.23	\$12.90	\$13.11	\$34.68	\$15.46	\$15.80	\$15.71	\$25.97	\$15.8
50	 Value of Housework in Hawaii 	2020 USD, Billions	\$12.66	\$12.72	\$12.99	\$12.97	\$12.96	\$12.85	\$12.65	\$13.29	\$12.95	\$14.04	\$14.15	\$14.29	\$13,79	\$14.30	\$14.32	\$26.09	\$16.68	\$15.69	\$16.19	\$56.57	\$25.5
	9 Hawali Total Annual Hours Volunteering	Hours	26200986.8	36276701.9	36909063	36213967	29190901	32620766	295.84429	32741189	31754099	49227658	40044041	30745915	41219502	29134068	27482599	27654605	27943680.8	38232760.6	29521940.4	28810920.2	2910000
1	0 Dollar Value of a Volunteer Hour in Hawaii	Current USD	12,264	12.26	34.17	14.66	15.06	25.4	15.89	36.47	17.16	17.94	18.08	18.14	21.67	22.16	29.14	29.39	23.8	25.4	26.87	27.98	20.5
111	a. Value of Volunteer Work in Hawaii	Current USD, Billions	0.4837899876	0.4823550672	0.5280042567	0.5308967562	0.5903134631	0.5023597964	0.6289967367	0.5390473828	0.5449009388	0.7216841845	0.7239962613	0.5577308981	0.9932266283	0.645389369	0.6359473409	0.6451818413	0.665059603	0.2171121192	0.7663818515	0.9061295-172	0.88900
12	 Value of Volunteer Work in Hawaii 	2020 USD, @illions	0.7271206183	0.7049056877	0.7524138671	0.7467495673	0.809548685	0.6657257617	0.8074963996	0.6781060489	0.6550127104	0.8706181474	0.8592122701	0.6417157161	1.006894221	0.7170158784	0.6952477326	0.7045070925	0.7171655012	0.7573658971	0.7898945604	0.81607464	0.88900
	2 Value of Unpaid Work in Hawaii	2029 USD, Billions	\$13.39	\$43.48	\$13.69	\$13.72	\$13.76	\$12.53	\$18.45	\$13.96	\$13.60	\$54.91	\$15.06	\$14.93	\$54.79	\$15.04	\$85.02	\$36.74	\$17.28	\$17.64	\$16.98	\$16.99	\$16.8
and the																							
CALCULATION	IS AND DATA SOURCES	alaran ana ang ang ang ang ang ang ang ang a	a second second	1000000000	alphine and	and a sugar from the state																	
	1 Household activities from ATUS (national) for years 20	69 to present in Table A-1 fro	reline entitled "Hou	sehold activities" s	++ Martinewalls	and the balles have																	
	2 Caregising activities from ATUS (national) for years 20	03 to present from line entitle	ed "Caring for and he	Hping household m	embers" in Table A	-1 see blig lineare	in grafter tables h	Am .															
	2 Calculation: Line 1 + Line 2																						
	4 Calculation: Line 3 * 365																						
	5 BLS Occupational Employment and Wage Statistics By	State; MEDIAN; http://www.	telde fuend vola side	100																			
	a. Calculation: Population - ALL Line 6b-d			0921014																			
- 60-6	d DBEDT Economic Data Warehouse: Population by Age	Table; https://dbedt.hawaii.g	phyleconomic/dataw	arehouse/																			
	7 Calculation: Line 4 * Line 5																						
8	a. Calculation: (Line 7/Line 6a)/1,000,000,000																						
	 Calculation: Row Ba/OPI-U 	A Contraction of the	a second a second	ana ang	Strange Strange																		
	9 2002-2015: View Data on "Hawaii OVCS Open Data" at	detainmention program, 2006-	2020: "Volumeering	in America-State 2	tera" at data sense	6100 R01																	
	D https://odependentector.org/wp.context/uploaduG	Out Rest Marine of Michaelen T	InterberState-3001-3	BRIDE T																			
111	a. Calculation: (Line 9 * Line 10)/1,000,000,000																						
13	 Calculation: Line 11a / CPI-U 																						
1.1.1	Calculation: Line 8b + Line 11b																						

Populate the Structure (+KH) Services from Human Capital – Unpaid Work

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ROM PR	OTECTED AREAS (+EN) capital provides ecosystem servi	cet that enhance utility beyond merely pr	ovisioning market goods and servic	oes; related to in	vectment in conser	vation.																		
						14 (
Service	from protected areasy total dev	eloped urban blue/green infostructure +	tutal cultivated land + total grassia	nd + tastil tropic	ail forest + tastai she	ub/kosub + total pa	untrine wetlands +	total wetlands/she	en + tutal desert + t	total open water														
_																			eter new data in ap	spropriate year; res	plicalate ane valities	1		
	anataka	Construction of the state									-1111		2000	2010	2011	2012	2013	2014	2015	2016	2017	2018	2029	2020
COUPS	Induction	3/3	Heitans	4.00	4.00	4.00	4.00	6.00	4.00	4.00	4.00	4.40	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.07
in i	ligh-intensity developed	turban blass/green infrastructure (15)	Hectaria	230.63	230.60	280.68	230.60	220.60	230.68	282.76	332.40	234.08	235.24	236.40	226.40	236.40	106.40	206.40	226.40	236.40	236.40	336.40	235.40	236.49
CAPS .	Dave space developed	untain biasylgreen infrastructure (19)	Hectaries	16.50	36.50	16.50	16.50	16.60	16.50	16-02	06.84	36.26	26.28	36.10	16.10	26.10	16.30	26.10	16.30	26.10	16.10	16.10	26.70	26.55
	lotal developed	\$108,157.00	Aug of 20205 2020 USD/haylyear J	16,725,594,70	26,725,894.70	36,725,594,30	26,725,534.70	36,725,994.70	36,725,594.70	26,842,404.26	26,859,212,82	27,076,023,38	37,193,493,64	27,309,642.50	37,309,643.50	27,309,642.90	17,209,642.50	27,309,642.50	27,209,642.50	27,309,642.50	27,209,642.50	27,309,642.50	22,308,642.50	37,309,642.98
100	Subfored land	Cultivated land (14)	Hectories	87.36	87.20	\$7.30	87.20	\$9.20	87.30	85.04	82.88	60.72	28.56	36.40	76.40	76.40	26.40	26.40	26.40	26.40	26.40	76.40	26.40	26.40
197	httunghag	Cultivated land (18)	Hectaries	87,582.78	87,182.79	87,182.78	87,182.78	\$7,282.78	1,787.30	2,773.48	4,759.26	1,746.04	4,252,32	1,718.60	4,718.60	1,718.60	2,718.60	1,718.60	1,718.60	1,718,60	2,718.60	1,722.60	1,718.60	1,718.68
	lotal cultivated	\$10,664.00	Avg of 20205 2020 USD/har/year 2	18,613,093,60	19,622,092.60	38,623,093,60	19,622,092,60	19,623,093.60	18,623,093.60	19,456,845.88	18,290,588.36	19,124,253.44	18,858,102.72	18,791,855.00	18,791,855.00	18,781,855.00	18,791,895.00	18,791,855.00	18,795,855.00	18,781,855.00	18,791,855.00	18,791,855.00	18,791,855.00	18,791,855.08
112	basiand	Grantand/rangeland (9)	Hectaries	8,791.30	9,791.20	8,793.30	8,781.20	8,791.20	8,291.30	8,295.82	8,782.56	8,797.24	8,785.82	9,785.60	8,784,60	9,794.60	8,784.60	9,284.60	8,784.60	8,784.60	8,788.60	9,784.60	8,794.60	9,784.68
	lotal grassland	\$1,640.00	Avg of 30205 3020 USD/har/year 2	56,057,568.00	16,057,568.00	16,057,568.00	16,057,568.00	16,057,568.00	16,057,568.00	16,055,409.20	36,053,398.40	16,051,073,60	36,048,908.90	16,046,761.00	36,346,744.08	16,046,744.00	16,046,744.00	16,046,744.00	35,046,744,00	16,006,744.00	16,046,764.00	16,046,764.00	26,046,744.00	36,046,764.00
650	vegrees	Thopical forest (6)	Hectares	68,780.63	68,780.60	68,780.60	68,780.60	68,780.60	68,780.60	68,775.76	68,770.92	68,766.08	68,761.34	68,756.40	68,756.40	68,756.40	68,756.40	68,766.40	68,756.40	68,256.49	68,756.40	68,756.40	68,766-40	68,756.43
	iotal tropical forest	\$5,910.00	Avg of 20205 2020 USD/ho/year o	408,075,399,90	438,075,299,80	408,005,299,80	438,075,399,80	408,075,298,80	408,075,299.80	402,046,594.08	438,017,868,36	417,989,152.68	407,960,426.92	401,991,721.20	407,821,721.30	407,891,731.20	407,981,721.30	407,931,721,20	407,982,721.20	407,991,721,20	457,942,722,30	403,821,721.20	452,941,731,20	407,821,721,38
APR22	eren/eren	Woodland & shrubland (k)	Hestanes	39,755.10	33,765.10	33,755.10	38,755.10	20,755.00	30,755.10	13,765.84	88,776.58	10,797.32	23,798.06	33,909.90	28,808,90	32,808,90	23,809,95	33,808,80	33,809.90	33, 509, 50	13,808,80	23,908.90	11,808.80	22,908,95
1.1.1	End/and	STATE	Aug of 20206 2020 USD/ha/yearS	64,683,262,00	54,683,362.00	\$4,683,262.00	edess'reston	54,693,262.00	\$4,683,362.00	54,708,663.80	54,718,059,60	54,785,458,40	54,752,857.30	54,770,256.00	54,770,256.00	54,770,256.00	\$4,778,256.00	\$4,770,256.00	54,778,256.00	\$4,770,256.00	54,770,256.00	\$4,770,256.00	54,770,256.00	54,770,256.00
No.23	substrate forested wetlands	Inibind wetbinds (4)	Hectanik	11,822.93	11,982.80	11,882.50	11,992.50	11,822.50	11,932.50	12,933.94	11,829.38	11,907.82	11,826.36	11,934.70	11,824.30	21,994.20	11,824.20	11,624.20	11,824.30	21,824.70	12,824.70	11,624.20	11,904.70	11,524.30
P24	sludine coublinub wetands	hibrd wetlands (4)	Hestanes	1,546.00	1,546.00	1,546.00	1,546.00	1,546.00	1,546.00	1,545.72	1,545.44	1,645.06	1,546.88	1,545.60	1,561.63	1,548.60	1,504.63	1,544.60	1,544.60	1,541.60	2,698.60	1,541.60	1,548.60	1,501.60
9735 	and we see find extends	mand wetchick (4)	Hectaries	718.40	711.40	/13.40	712.40	/12.00	71.6.40	11.06	100.00	100.42	708.04	106.70	706.70	100.70	106.70	106.70	706.70	100.70	706.70	706.70	705.70	706.70
	Goud inte aquatic Ded	mand wetlands (4)	Hectares	16.00	20.00	18-00	20.00	16:00	20.00	The state and	DB.3M	20.78	Parate.	17.00	20.21	17.90	20.00	The last sale as	12.40	20.00	17.40	17.40	17.40	Division in the second
and a	and participation with the	joid, 788.08	And in some state contraction	10,00,000	749,000,000	10,000,000	749,000,498,80	70,00,000,000.00	740,010,000.60	100,000,000.00	740,876,726.85	ALCOLOUM	10,00,000,000	700,376,182.20	10,10,0010	786,376,182,20	10,00,00,00,00	100,270,202,200	10,00,000	100,000,000,000	744,276,382.40	714,276,242,20	746,276,182,20	110,276,382.20
	Contraction of the second	Constant opposition (10)	Personer	10.00	1.00	10.70	10.00	10.00		100		10.00		200	10.00	2000	10.00	2.00	10.00	2000	10.00	10.00	1.00	200
ACTOR N	mater another and the	Coartial optimite (a)	Hestards.	12.60	42.00	17.60	12.00	1240	17.60	40.34	100	10.42	8.90 H-16	130	82.54	10.10	22.50	22.10	22.40	22.00	82.60	22.00	12.50	30.47
6120	inconsolidated shoes	Coantal sectores (20	Hectory	16.40	5.40	16.40	26.49	16.40	16.40	17.26	18.12	18.92	29.84	20.70	20.35	10.70	20.70	20.70	20.30	20.70	20,70	20.70	20.70	20.20
	intral metuorine continues a site	5316 312 0	And of 20005 2020 USER advances	12 100 100 00	12 100 202 00	12 200 200 000	12 200 200 400	12 200 300 001	13 100 100 67	12 677 257 60	14 (155 109-00	14,432,164,31	14 811 116 45	15 189 034 60	15 100/104 60	15 189 (184 68)	15 199 494 49	15 103.034.60	15 199 (124 60	15 180 034 50	15 199 (191 60	15 189 034 60	15 199 (104 60	15 100 004 67
in and	income land.	Decourt (18)	Hartweis	40 100 10	44 139 20	44,456,58	40,139,30	45,428,30	44, 139, 50	65 147 52	20,450,24	AC 165 BC	66.135.18	66 188 M	22 104 45	CC 101.00	66 miles 400	66 184 46	66 1984 40	10.104.00	65 100 M	66 184 M	66 100 40	55 184 M
	lotal desert	40.00	Aver of 20205 2020 USD/har/war	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.00	0.00	4.40	0.07
21	Carel water	Clean sea/option (2)	Hestaries	416.80	456.40	416.82	456.80	416.40	456.90	458.00	461.40	663.70	466.00	468.30	468.80	068.20	468.30	05.80	068.80	468.20	468.30	668.20	668.30	468.87
	lotal open water	\$1,164.00	Ave of 20206 2020 USD/ha/war	521,715,30	\$21,725,20	\$21,715,20	531,715,20	\$81,715,20	531 715 30	534,292,40	\$27,069,62	\$39,746,80	542-424-00	545,101,20	545,201,20	545 101 20	545,101,20	545,102,20	545,001,00	545 101.20	545.002.20	545 201 20	\$45,102,20	545 301 30
	OTAL services from protected as	de .	2020 USD/Wear 1	1,271,022,130. 1	1274,027,880.50	12740077,336.50	274,827,330,58	1,374,037,330,50	1,274,027,330.58	1,378,252,784.90	273,505,883,30	1,372,659,181,70	1273,812,398,10	1,374,860,576,70	1,124,860,576.30	1274,860,536,78	274,860,576.20 1	274,860,576,78	1,374,860,576.70	274,860,576,70	1,374,860,576,70	274,868,576.10	174,860,536.70	4,274,868,576,20
	OTAL services from protected as	NE 1	3030 LKb 886ms	1.37	1.19	1.32	1.22	327	1.19	1.27	1.32	1.27	137	1.27	1.27	1.19	1.37	1.10	1.37	1.39	1.27	1.19	1.17	1.37
	an analysis in the second																							
S AND	DATA SOURCES																							
+ Enco	ener Area Database MD-15/Pe	m the USGS GAP database) to identify pr	steamed areas with GAP protection	status 1 or 2 in 1	Hawaii, MD-US Ver	tion 3.5 was release	ed in September 20	20 (more infolia th	e Protected Areas 6	as steps and Protect	ted Areas GIS Data	tabi). A time-series	of protected area -	establishment is lac	king, therefore we	use this same prote-	ted area footprint f	for all years.						
y the	ypes of land cover that overlay th	e protected areas for Hawaii in kind per r	ecosystem category in CCAP																					
	IGAA C-CAPS (Coastal Change Ar Instructed areas (in km2) accordin	allysis Program) for near shore in Hillfor 25 g to ecceptions using CCAP categories (1	XIS and 3010/11 depending on it to strongh 25 but only for PRD statu	nd for 23 catego c. 1.8. 2; see "Ap	ones (not including pendis: Protected /	tundics or ice/know weak Giti Bata* tab																		
en l	CSP land type categories as own	NOAA CCAP Regional Land Cover Openity	ation Scheme, C-CAP Regional Lan	d Cover Canolic	ation Scheme Mas	(logast seas pow/	digitalicas to/trainin	Koop land cover-	Constitutions Intervi															
fere	or CONF categories with ESVD ca	regories to find the most relevant and as	sicable overlaps			1.000			1000															
	WD categories for Momey/icoo	stems in the "EVO Summary Values" tak	complete ESVD Version Dec 2000	can be found at	https://www.eo-pa	mentip.org/eaved	ienad-downio.ad/ien	out version decent	er-2020/															
(Without	nt ecosystem (15) value in 2020 L	SQ/ha/year; convert kind in Step 2 to her	tares and multiply by ESVD value h	ound in Step 3; I	SVD values are tho	n Summary Values	tab, the Grand Tota	al (biome) less prov	islanding services (i.	e, laborated out to	od, water, raw mat	wish, genetic reso	ster, medicinal res	pierces, & preamer	tal recources) in 2	205/ba/year								
-	only have only two years of CCAP	data (2005, 2000) and one year of Milt (2	Stal, we assume that the total are	a designated as	protected or the to	tai area under each	category has rema	aned relatively con	the throughout th	e entire time period	I. So for those year	s in which no CCAP	data are available (2000-2004, 2006-2	60% and 2011-202	I) we assume 2005	events for 2000-2004	, interpolate betwe	een 2005 and 2016	and assume 2010	levels for years 205	1-2020.		
			al a seconda como a presida de acordo a se al-	the state of the s		and the second	and the second state and provide the	and a site of the second second second second			and the second se	Contra da las materiales per a period		care at the set of sector being a large	a second and the first second seco	and the second	and the second	second a state of the second second	and the second	and the second se	and the second			

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Populate the Structure (+KN) Services from Protected Areas

COMMUTING

Description: Commuting is included in GPI is an attempt to adjust for underliable side effects related to employment that otherwise are captured as an increase in Personal Consumer Durables). Direct costs relate to the opportunities while indirect; not to be contrusting indirect; not to be contrusted or paying public transit fares, while indirect; on as lost opportunities while commuting. This indicator est: Methodology: The calculation of the direct cost of commuting by car uses census data to formulating by public transit (i.e. The line) neutropied by the care (a and from), adjusted by the care (a and from), multiplied by the sverage annual vehicle miles traveled (xMI), adjusted by assuming that only iON of miles are dedicated to commuting by public transit uses the proportion of scenary ion (i.e. The line) neutropied by the care (a and from). Calculation: Total direct plus indirect costs of commuting = (total direct public transit costs + total direct driving costs + total indirect cost of commuting time)

| Variable | Units | | 10 M | 2007

 | 80
 | 2004

 | - 20/01 | 40.00 | ann. | 2168 | 2005 | 2010
 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016
 | 2017 | 2018 | 2019 | 2020 | -
 |
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1 Faris for The Bus	Current USD	3	2.5	1.5	

 | .2
 | 2

 | 2 | 1.2 | 2 | - 2 | 2.25 | 2.5
 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5
 | 2.5 | 2.25 | 2.25 | 2.75 |
 |
| 2 Percent workers taking public transit (Hawaii) | * | 6.36 | 6.18 | 6.06

 | 5.94
 | 5.80

 | 5.70 | 5.40 | 5.60 | 6.30 | 6.00 | 6.60
 | 5.90 | 6.30 | 6.50 | 7.20 | 7.00 | 6.70
 | 6.10 | 5.70 | 5.43 | 1.77 |
 |
| 3 Workers 56 years+ (Hawaii) | Penans | 563,154 | 567326.30 | 573498-40

 | \$75678.60
 | 579842.80

 | 584,015 | 629,113 | 627,354 | 656,455 | 618,254 | 657,295
 | 650,063 | 670,355 | 672,446 | 685,447 | 704,854 | 708798
 | 702925 | 707479 | 702060 | 653,095 |
 |
| 4 Number of workers taking public transit | Persons | 25,429 | 35,061 | 34,638

 | 34,295
 | \$9,747

 | 23,259 | 33,902 | 25,130 | 41,357 | 38,289 | 43,385
 | 38,354 | 64,958 | 41,019 | 49,353 | 49,344 | 47,489
 | 42,940 | 40,826 | 37,911 | 24,629 |
 |
| 5 Total Direct Public Transit Costs | Current USD | 17,739,351 | 26,295,569 | 25,574,602

 | 34,194,834
 | 33,746,853

 | 33,288,855 | 38,993,102 | 35,129,584 | 41,356,665 | 49,075,395 | \$4,326,938
 | 47,942,073 | 56,542,335 | \$1,374,008 | 62,698,230 | 64,679,975 | 59,365,883
 | \$3,675,348 | \$5,448,667 | 63,127,965 | 33,864,875 |
 |
| 6 Total Direct Public Transit Carts | 2000 USD | 26,661,668 | 38,427,909 | 37,368,053

 | 48,097,821
 | 46,236,400

 | 64,134,295 | 48,612,895 | 43,849,885 | 48,213,897 | \$1,964,864 | 64,361,916
 | \$5,161,336 | 68,286,625 | \$6,954,492 | 67,642,679 | 67,354,523 | 64,012,696
 | 56,673,346 | \$3,549,840 | \$2,771,049 | 33,864,875 |
 |
| 7 Percent workers driving alone | × | 63.9 | 64.80 | 65.70

 | 66.60
 | 67.50

 | 68.4 | -67 | 68 | 65.7 | 67.7 | 66.6
 | 67.1 | 65.2 | 67.600 | 66.400 | 63.400 | 65.900
 | 67.600 | 67.300 | 69.300 | 66.200 |
 |
| 8 Percent workers carpooling | N | 18 | 18.12 | 12.64

 | 26.86
 | 36.28

 | 15.6 | 26 | 25.2 | 16.2 | 14 | 13.8
 | 14.2 | 25.3 | 18,500 | 13.900 | 13.500 | 13.600
 | 13.300 | 14,700 | 18.800 | 22.340 |
 |
| 9 Number of Cars Commuting | webates. | 413,355 | 419,994 | 425,881

 | 480,018
 | 438,593

 | 445,019 | 471,835 | 474,349 | 484,864 | 476,301 | 483,113
 | 482,346 | 488,854 | 499,964 | 501,404 | 122,694 | \$32,384
 | \$22,675 | \$28,139 | \$33,315 | 469,379 |
 |
| 33 Annual Vehicle Average Vehicle Miles Traveled | WMT per Whiche | 9,058 | 9,052 | 9,050

 | 8,565
 | 8,040

 | 9,045 | 9,044 | 9,043 | 9,006 | 9,091 | 9,022
 | 9030 | 9,011 | 9006 | 8409 | 9465 | 9430
 | 9015 | 9011 | 9054 | \$305 |
 |
| 11 VIME to and from work | BON-of VINE | 3212.4 | 2725.6 | 2715

 | 2213.8
 | 2712.6

 | 2213.5 | 2713.2 | 2712.9 | 2710.8 | 2009.8 | 3708.1
 | 2706 | 2709.3 | 2704.8 | 2523.7 | 2839.5 | 2829
 | 2824.5 | 2709.3 | 3947.660 | 2882.280 |
 |
| 12 GSA POV rates per mile | Current LISD | 0.325 | 0.845 | 0.965

 | 0.360
 | 0.375

 | 0.665 | 0.445 | 0.485 | 0.545 | 0.950 | 0.500
 | 0.510 | 0.555 | 0.565 | 0.960 | 0.525 | 0.540
 | 0.535 | 0.545 | 0.580 | 0.575 |
 |
| 13 Total Direct Driving Costs | Current USD | 365,096,567 | 393,210,495 | 422,097,095

 | 422,258,345
 | 446,147,860

 | 537,364,299 | 569,681,009 | 623,996,720 | 715,740,021 | 110,029,367 | 654,157,567
 | 665,666,436 | 732,692,825 | 763,202,936 | 708,340,126 | 853,408,588 | 798,025,334
 | 789,817,671 | 778,097,665 | 880,680,005 | 777,907,604 |
 |
| 14 Yotal Direct Driving Conts | 2000 USD | 548,668,148 | \$74,485,151 | 607,158,572

 | \$83,941,349
 | 611,265,081

 | 712,113,629 | . 231,807,776 | 778,892,904 | 860,375,334 | 856,972,300 | 776,420,617
 | 765,964,505 | \$25,891,126 | 847,894,694 | 774,296,852 | 931,890,541 | 860,548,795
 | 838,992,364 | 803,969,857 | 891,544,815 | 777,907,604 |
 |
| 15 Hawaii Mean Travel Time to Work, One Way | Minutes/commuter one way | 24.10 | 24.42 | 24.74

 | 35.06
 | 35.28

 | 25.70 | 25.50 | 26.40 | 26.10 | 25.50 | 25.50
 | 25.70 | 36.00 | 26.80 | 37.90 | 37.40 | 27.40
 | 27.00 | 17.60 | 18.10 | 37.98 |
 |
| 16 Total Annual Hours Spent Commuting | Hours/commuter/year | 200.69 | 209,90 | 206.17

 | 208.83
 | 211.50

 | 214.17 | 212.50 | 220.00 | 317,50 | 212.50 | 312.50
 | 214.17 | 216.67 | 222.33 | 232.50 | 228.33 | 328.33
 | 325.00 | 230.00 | 284.17 | 213.17 |
 |
| 17 Number of workers working from home (not comm | nutin Persons | 20,196 | 31,539 | 22,861

 | 24,294
 | 26,526

 | 26,859 | 28,192 | 29,534 | 30,857 | 22; 1.89 | 33,533
 | 29,903 | 29,496 | 29,688 | 20,845 | 82,426 | 34,733
 | 30,979 | 38,254 | 33,699 | 69,485 |
 |
| 18 Average Annual Moge | Current LGD | 30,619 | 31,342 | 32,659

 | 33,226
 | 85,191

 | 36,347 | 32,284 | 29,465 | 40,664 | 41,328 | 41,681
 | 42,454 | 43,565 | 438218 | 45201 | 4684.7 | 481.77
 | 49670 | 50974 | \$2680 | \$39965.50 |
 |
| 19 Average Annual Hourly Wage Adjusted for non-nuit | lance Current LISD | 11.09 | 11.35 | 11.76

 | 12.14
 | 12.67

 | 13.08 | 13.60 | 14.21 | 24.64 | 34.88 | 15.03
 | 15.18 | 15.64 | 15.78 | 26.27 | 26.89 | 17.54
 | 17.88 | 18.35 | 18.96 | 23.42 |
 |
| 20 Total indirect Cost of Commuting | Current USD | 1,202,328,584 | 1,248,175,584 | 1,330,276,855

 | 1,298,653,937
 | 1,485,259,005

 | 1,561,848,115 | 1,736,948,907 | 1,868,468,439 | 1,991,899,049 | 1,915,812,304 | 1,988,960,263
 | 2,829,969,032 | 2,567,687,627 | 2,265,285,891 | 2,476,578,826 | 2,589,501,853 | 3,669,485,633
 | 2,007,522,640 | 2,824,774,220 | 2,968,540,998 | 2,644,408,798 |
 |
| 11 Total Indirect Cost of Convenuting | 2020 USD | 1,807,060,762 | 1,825,524,344 | 1,913,787,011

 | 1,967,830,788
 | 2,034,946,366

 | 2,069,094,045 | 2,229,868,841 | 2,310,282,603 | 2,394,418,628 | 2,812,178,865 | 2,360,699,977
 | 2,335,536,618 | 2,441,536,863 | 2,816,691,495 | 2,707,504,444 | 1,831,977,487 | 2,878,547,452
 | 1,858,749,363 | 2,911,438,712 | 8,004,758,404 | 2,644,408,793 |
 |
| 22 Total Direct plus Indirect Cont. of Commuting | 2000 USD | 3,382,390,538 | 2,438,437,404 | 2,558,218,636

 | 2,629,258,953
 | 2,682,047,848

 | 3,825,321,969 | 3,004,828,983 | 3,155,005,611 | 3,304,507,300 | 8,220,075,829 | 3,304,482,510
 | 3,256,642,459 | 3,330,754,689 | 3,421,560,561 | 3,549,338,075 | 8,891,209,951 | 8,808,108,944
 | 1,349,355,074 | 3,770,558,269 | 3,948,074,289 | 3,456,181,372 |
 |
| 29 Yotal Direct plus indirect Costs of Commuting | 2020 USD, Willows | 2,989 | 2,438 | 2,558

 | 3.609
 | 3,693

 | 2,825 | 8.005 | 8.155 | 1.105 | 3.220 | 3.200
 | 2.153 | 8,398 | 8.400 | 1.549 | 1.831 | 8.803
 | 3.348 | 8.771 | 8.948 | 3.456 |
 |
| | Vertector 1 Famic for The Isus 2 Percent workers taking public transit (stawaii) 3 Workers 16 yeart+ (Hawaii) 4 Number of workers taking public transit 5 Total Direct Public Transit Costs 6 Total Direct Public Transit Costs 7 Percent workers taking stone 8 Percent workers carpooling 9 Number of Cast Commuting 10 Annual Vehicle Asserage Vehicle Miles Transied 11 Wiff to and from work 12 GAA POV rates per mile 13 Total Direct Driving Costs 14 Total Direct Driving Costs 15 Hawaii Mean Travel Time to Work, One Way 16 Total Direct Driving Costs 17 Number of workers usering from home (not commuting 18 Number of workers taking from home (not commuting 19 Number of workers taking Costs of Commuting 10 Total Indirect Cost of Commuting 11 Number of workers taking from home (not commuting 11 Total Indirect Cost of Commuting | Variable Units 1 Farms for The Has. Carvent USD 2 Percent workers taking public transit (Howaii) N 3 Workers to years - (Howaii) Persons 4 Number of workers taking public transit Persons 5 Total Direct Public Transit Costs Carvent USD 6 Total Direct Public Transit Costs 2000 USD 7 Percent workers taking alone N 8 Percent workers caposing N 9 Number of Cars Commuting Wetable 9 Number of Cars Commuting Wetable 10 Number of Cars Commuting Wetable 11 Wift to and from work Carvent USD 12 Stat Direct Driving Costs Carvent USD 13 Total Direct Driving Costs 2000 USD 14 Total Direct Driving Costs 2000 USD 15 Total Direct Driving Costs 2000 USD 16 Total Moust-fipent Commuting Resons 17 Number of worken working from home (not commuting Resons | Variable Line Constitution 1 Farse for The Rus Convent USD 1 2 Percent workers taking public transit (news) N 6.28 3 Workers 15 yeart+ (Hawaii) Percent 6.28 4 Number of workers taking public transit Percent 6.28 5 Stati Direct Public Transit Const Current USD 17,799,651 6 Stati Direct Public Transit Const 2000 USD 25,661,668 7 Percent workers taking public transit Stati Direct Public Transit Const 2000 USD 25,661,668 6 Stati Direct Public Transit Const 2000 USD 25,661,668 643,855 7 Percent workers taxpooling N 643,855 643,855 8 Percent workers taxpooling N 643,855 643,855 9 Number of Cars Commuting Garset USD 643,855 10 VMT no and from work 2000 USD 643,056,667 12 Stati Direct Draing Corst Current USD 643,066,667 13 Stati Direc | Variable Urian 2000 1 Fares for The Rus Current USD 5 1.5 2 Percent workers taking public transit (Hawaii) N 6.38 6.38 3 Workert 26 years+ (Hawaii) N 6.38 6.38 4 Number of workers taking public transit Percent 563,558 562,556 5 Total Sovert Public Transit Cores Current USD 17,798,851 552,356,569 5 Total Sovert Public Transit Cores 2000 USD 26,661,668 38,427,669 7 Percent workers carpsching N N 61.8 64.89 8 Percent workers carpsching N 18 18,427 9 Percent workers carpsching N 18 18,427 10 Annual Whick Awarge vertick Miles Transid Will gar vehicle 413,555 419,564 10 Annual Whick Awarge vertick Miles Transid Will gar vehicle 3,056 419,564 10 Annual Whick Awarge vertick Miles Transide Will gar vehicle 3,0564 418,427 <td>Vertable Lifter 2000 2000 2000 1 Farset for The Fax Current USD 1 1.5 1.5 2 Percent worken taking public transit jeawaii N 6.216</td> <td>Variable Lister James LSD <thjames lsd<="" th=""> <thjames lsd<="" th=""> <thjames< td=""><td>Variable Lines <thlines< th=""> Lines Lines <</thlines<></td><td>Variable Data armon <</td><td>Variable Union 1000 1000 1000 2000</td><td>Variation Links Carrier LGD Links Carrier LGD Links Carrier LGD Links Links Carrier LGD Links Links Carrier LGD Links <thlinks< th=""> <thlinks< th=""> <thlinks< th=""></thlinks<></thlinks<></thlinks<></td><td>Variable Litting 20000 15000 15000 200000 200000 2000000 20000000</td><td>Variable Lines 1900 1900 1900 2000</td><td>Verside Lotes 2000 2500 2600 2000</td><td>Vanishin Listen Parte for The Rat Parte Parte for The Rat Parte Part Parte Parte</td><td>Advestable Lines 27000 2000</td><td>Avenalds Intern 2000</td><td>Validation Islam 2000</td><td>Controls Long Anno Parto <t< td=""><td>Unable Unable Unable<</td><td>Undata Undata Undata Proces Proces<</td><td>Control Union Junit <</td><td>Visibal Univ 1000 1000 1000 1000 1000 1000 1000 100000 1000</td><td>Valuation Lining Altico Jointo Join</td></t<></td></thjames<></thjames></thjames></td> | Vertable Lifter 2000 2000 2000 1 Farset for The Fax Current USD 1 1.5 1.5 2 Percent worken taking public transit jeawaii N 6.216 | Variable Lister James LSD James LSD <thjames lsd<="" th=""> <thjames lsd<="" th=""> <thjames< td=""><td>Variable Lines <thlines< th=""> Lines Lines <</thlines<></td><td>Variable Data armon <</td><td>Variable Union 1000 1000 1000 2000</td><td>Variation Links Carrier LGD Links Carrier LGD Links Carrier LGD Links Links Carrier LGD Links Links Carrier LGD Links <thlinks< th=""> <thlinks< th=""> <thlinks< th=""></thlinks<></thlinks<></thlinks<></td><td>Variable Litting 20000 15000 15000 200000 200000 2000000 20000000</td><td>Variable Lines 1900 1900 1900 2000</td><td>Verside Lotes 2000 2500 2600 2000</td><td>Vanishin Listen Parte for The Rat Parte Parte for The Rat Parte Part Parte Parte</td><td>Advestable Lines 27000 2000</td><td>Avenalds Intern 2000</td><td>Validation Islam 2000</td><td>Controls Long Anno Parto <t< td=""><td>Unable Unable Unable<</td><td>Undata Undata Undata Proces Proces<</td><td>Control Union Junit <</td><td>Visibal Univ 1000 1000 1000 1000 1000 1000 1000 100000 1000</td><td>Valuation Lining Altico Jointo Join</td></t<></td></thjames<></thjames></thjames> | Variable Lines Lines <thlines< th=""> Lines Lines <</thlines<> | Variable Data armon < | Variable Union 1000 1000 1000 2000 | Variation Links Carrier LGD Links Carrier LGD Links Carrier LGD Links Links Carrier LGD Links Links Carrier LGD Links Links <thlinks< th=""> <thlinks< th=""> <thlinks< th=""></thlinks<></thlinks<></thlinks<> | Variable Litting 20000 15000 15000 200000 200000 2000000 20000000 | Variable Lines 1900 1900 1900 2000 | Verside Lotes 2000 2500 2600 2000 | Vanishin Listen Parte for The Rat Parte Parte for The Rat Parte Part Parte Parte | Advestable Lines 27000 2000 | Avenalds Intern 2000 | Validation Islam 2000 | Controls Long Anno Parto Parto <t< td=""><td>Unable Unable Unable<</td><td>Undata Undata Undata Proces Proces<</td><td>Control Union Junit <</td><td>Visibal Univ 1000 1000 1000 1000 1000 1000 1000 100000 1000</td><td>Valuation Lining Altico Jointo Join</td></t<> | Unable Unable< | Undata Undata Undata Proces Proces< | Control Union Junit < | Visibal Univ 1000 1000 1000 1000 1000 1000 1000 100000 1000 | Valuation Lining Altico Jointo Join |

CALCULATIONS AND DATA SOURCES

1 DEEDT Databack Table 18.26- BUS FARS CHRONOLOGIK FOR OHHL: 1971 TO 2021 One was cauti fare For year 2000 see Hawaii Census 2000 Profile (C28/PR04/00-Hi assed Aug 2002) at http://www.census.gov/prod/2002pubs/c28pro/00-Hi pdf For years 2000-2004, use 2000 Centus and extrapolate: US Centus Bureau publication CEXPROF/00-HI Haveni 2000. Centus 2000 Profile Table DP-3. Profile of Selected Economic Characteristic2XPROF/00-HIC: 2000 https://www.centus.gov/prof/2003/ond/uS24par0F/01-11.pdf For years 2005-2009, based on previous ACS data tables (and values recorded in our prior GPI spreadsheet from 2014) but those data were not yet inigrated from FactFinder to cessus gov For 2020 data - The Census Bureau did not release its standard 2020 ACS 1-Year Experimental Estimates (by state) and XX200802 Travel Time to Work (by stat Table ID: XX200801 esperimental data: Total Workers 36 years- in 2020 for Havail + 653.095 Table ID: XX200804 experimental data: # Workers car, truck, san drave alone + 432,382 Table ID: 8X200801 experimental data: # Workers car, truck, van carpooled+ 34,058 Table ID: 8K200801 experimental data: # Workeys 16+ taking public transportation = 34,629 or 8,77% of total workeys 16+ Table (D: IX200802 experimental data: # Workeys 16 years and over who did not work from home \$88,630 No figure for mean travel time in 2020 is available in this table; data only include the number of workers per range of commute time (e.g. < 10 mins, 10-29 mins, 30-69 mins, and 60+ mins) ** one year estimates vs. 5 year estimates from ACS 3 From ACS Table S0801 for 2018-2018, http://doi.org/webs/table/to-3088g-b00000051536d-8C98201 tearth2016/to-getA2054bit/to-getA20 Data for 2000 taken from experimental data tables as placeholder until next release estimated by Census for reid to late March 2023 4 Calculation: Howali Workforce * Percent of Workers Taking Public Transit or Line 3 * (Line 3/300) 5 Calculation: If in workforce taking but a 250 work days per year a 2 trips per day a one way faw, Line 4 * 2 * 250 * Line 1. 6 Calculation: Total Direct Public Transit Costs / CPI-U Ito adjust to base year 2020; Line 5 / CPI-U P From ACS Table S0801 for 2005-2012 percent of workers 16 years and older drove alone vt. carpooled; <u>https://doi.org/reduci/table?or1088.g-000000005158.d-AC00200 /vg/%200.d-ac002000.d-ac00200.d-ac00200.d-ac00200.d-ac00200.d-ac002000.d-ac00200.d-ac00200.d-ac00200.d-ac00200.d-ac00200.d-ac00200.d-ac002000.d-ac002000.d-ac00200.d-ac002000.d-ac002000.d-ac002000.d-ac002000.d-ac002000.d-ac002000.d-ac002000.d-ac002000.d-ac002000.d-ac002000.d-ac002000000.d-ac00</u> 8 From ACS Table SOBUL for 2005 2012 percent of section 16 section 16 section 16 section 20 control to be for the section 20 control 9 Calculation: Number of workers driving alone plus 50% of workers who carpool; (Line 3/ 200 * Line 3/+100 * Line 3/ 100 * Line 3/ 10 DIRED! Detailook Table 18:17- MOTOR VEHICLE PUEL CONSUMPTION AND VEHICLE MILES, 1992 TO 2020; https://dis.hepsil.acu/docd/incomerc/databook/incomercia.pd 11 Calculation: Assume 20% of annual VMT to/from work based on figures from US Department of Transportation Report: Tobic 24, Commute Trips and VMT and Total VMT by War 26(8, 1817, 1988, 1819, and 1995 rpTS, and 2001 and 2009 HerTS 12 http://www.gua.gov/trans/plan.kook/transportation.airfam.gov.etc/arkote/vicomed.velide-misuae-stoc/pov-misuae-stoc/arkote/ 13 Calculation: (Average Annual VMP x 30% x 65A rate per mile); (Line 9 * Line 11 * Line 12) 14 Calculation: Total Direct Driving Cont. / DPHJ (to adjust to base year) Line 14 / CPH-U 15 https://tatacensus.gov/cedu/Table?e-SIB&e-ORODODUS15&e-ACSIDID: http://table.biologics.cth.07able&biol_ACIST170110.50801&biol=hesieue-mue. 16 Calculation: (Hawaii Mean Travel Time to Wark * 2 trips * 250 workdays)(40 minutes; (Line 15 * 2 * 250)(60 17 For year 2000 see blavall Centus 2000 Profile (C2XPROF/00-Hill assed Aug 2002): Years 2001 to 2009 are interpolated; Years 2010-2019 from ACS Table S0001 for 2010-2019; for 2020 use experiencedal data table 20209801 18 Disi Dil Databack Table 12.29, "Average Annual Wage in Current & Constant Dollars: 1969-2019"; https://lifet.howaii.gov/dbeck/icconcric/databack/2003-individual/12/12/12/0 odf 29 Calculation: (Average Annual Wage/2000)*0.72; (Line 18/2000)*0.72; (L 20 Calculation: Total Annual Hours Spent Commuting * Average Annual Hourly Wage (Adjusted) * (# Workers Sir- years - # workers working at home), or Line 16 * Line 19 * (Line 37) 21 Calculation: Total Indirect Cost of Time / CP-U (to adjust to base year); Line 20/CPI-U 22 Calculation: (flotal Direct Public Transit Costs + Total Direct Driving Costs + Total Indirect Cost of Lost Time(; (Line 6 + Line 14+ Line 14)

Stored Report Building Trade in Courts 4, Total February Building Courts 4, Total Statis

Populate the Structure (-SC) Social Costs - Commuting



Last bits of advice...

- Build your team (GIS, Excel, natural & social sciences)
 - Meet regularly 0
- Don't do it isolation
 - Look for and engage local partners (gov't, community, academia) 0
 - Reach out to other states who have also done GPI 0
- Find a champion

0

Brainstorm about policy applications

- Be open to locally relevant, creative, or innovative proxies, and auxiliary indicators
- Have fun!!
 - Make it a learning experience for everyone 0



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Moderator: Rob Moore – Scioto Analysis

Speakers: Eli Lazarus – University of California, Berkeley Regina Ostergaard-Klem – Hawai'i Pacific University ASSOCIATIC PUBLIC POL & MANAGEN

Webinar



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Please contact Registration@appam.org with questions.

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