Odisha Economy Discussion Series 3

Macroeconomic Impact of Fani and Policy Suggestions

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(an ICSSR institute in collaboration with Government of Odisha)

August 2020

Odisha Economy Discussion Series

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Citation:

Srijit Mishra & Sarthak Gaurav (2020), "Macroeconomic Impact of Fani and Policy Suggestions", Odisha Economy Discussion Series 3, Nabakrushna Choudhury Centre for Development Studies, Bhubaneswar, August 2020

Macroeconomic Impact of Fani and Policy Suggestions[1]

Srijit Mishra and Sarthak Gaurav[2]

Purpose – In the summer of 2019, the extremely severe cyclonic storm Fani ravaged several districts of the Odisha. The multisectoral teams involved in the Disaster, Loss and Needs Assessment (DLNA) of Fani provided an estimate of damage and loss and suggested paths towards recovery and reconstruction.

Design/methodology/approach – This study is based on Post-Disaster Needs Assessment (PDNA) methodology that synthesises the damage and loss assessment (DaLA) framework and human recovery needs assessment in the form of recovery and reconstruction. It posits a scenario without the disaster and simulates two post-disaster scenarios: without any recovery and reconstruction and with full recovery and reconstruction. The impact of the loss at the aggregate level was further disaggregated by economic activities and activities requiring special attention were identified.

Findings – The study presents the sector wise impacts, their ownership structure, the need for prioritisation based on damage and loss along with a build back better perspective. It also brings out the importance of fiscal constraints in committing to recovery and reconstruction pathways and identifies their policy implications in the context of natural disasters. The study also brings out certain methodological challenges and how they can be addressed, particularly given a race against time owing to the importance of time bound inputs to policy makers. It presents a strong case for the need for multidisciplinarity in DLNA exercises. Based on the exercise, policy suggestions (or, *DaSa NiTi*, ଦଶନୀତି) are presented in order to help Odisha build back better.

Originality/Value – The study brings out the conceptual and pragmatic challenges in assessing the macroeconomic impact of disasters in the developing economy setting.

Keywords: Cyclone Fani, Damage and Loss, Disaster Finance, Economic Activity, Fiscal Implication

JEL Classification: E62, E65, H12, H70, O11

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[1] This is a revised version of a chapter prepared for United National Development Programme (UNDP) through Nabakrushna Choudhury Centre for Development Studies (NCDS), as part of Damage, Loss, and Needs Assessment (DLNA) exercise following cyclone Fani, which involved the state government and multilateral agencies (see Chapter 17 in Government of Odisha et al 2019). The chapter benefited from comments and discussions with Abha Mishra, Rita Missal, Hippu Salk Kristle Nathan, Sidheswari Sahoo Krishna Vatsa, members of different sectoral teams, officials from Government of Odisha, and inputs by UNDP's editorial team. For the current exercise, we benefitted from comments by an anonymous reviewer and Narayan Nayak.

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1 Introduction

The extremely severe cyclonic storm Fani of May 2019 considerably impacted lives and livelihoods of over 1.65 crore (16.5 million) people across 14 districts of Odisha. Damages and losses across sectors are estimated at INR 24,176 crore (around USD 3.5 billion). In order to estimate the macroeconomic impact of Fani, we followed the Post-Disaster Needs Assessment (PDNA) methodology that synthesises the damage and loss assessment (DaLA) framework and human recovery needs assessment in the form of recovery and reconstruction.[3] The methodology considers damages as replacement value of partially or totally damaged physical assets and losses as the change in flows associated with the damage. It offers a flexible framework to assess the impact of the disaster on macroeconomic performance of a country or a region within a country (GFDRR 2017, ADPC 2015). In India, a PDNA exercise was earlier conducted in Kerala for the floods and landslides of 2018 (UNDP 2018). This is the first exercise for Odisha, which was led and owned by the state government in collaboration with a number of multilateral agencies and comprised of multi-disciplinary experts and is referred to as Damage, Loss and Needs Assessment (DLNA) exercise, see Government of Odisha et al (2019).

The subsequent part of the paper is structured as follows. Section 2 presents the methodological approach. Section 3 contextualises the economy of Odisha prior to disaster and also on account of damage and loss from cyclone Fani. Sections 4 points out the impact of cyclone Fani on economic growth projections andalso by economic activities. Section 5 elaborates on those activities that require special attention, viz, energy, housing, livelihood, and agriculture, livestock and fisheries. Section 6 points out that damages are largely on public properties, but the losses are on private entities. Section 7 discusses implication of reallocation of resources leading to renovation and reconstruction, and it also discusses the fiscal implications of disaster. Sections 8 and 9 provide some policy suggestions and concluding remarks, respectively.

2 Methodological Quagmire

The first challenge is that PDNA or DaLA on DLNA exercises are taken up with short notice that has to work in coordination with the local administration without disrupting their ongoing relief and rehabilitation work and come up with a quick report that helps the administration. This implies that the work should not and cannot start immediately after the natural disaster and should be completed in a time bound manner. For instance, the cyclone Fani DLNA report was ready by mid-July and officially released by early August, in about three months of the disaster.

A challenge quite specific to the macroeconomic impact and its sister human impact chapters in the report is that while these chapters get the same deadlines, they depend upon the other sectoral chapters and can start working only when they get a draft that will not change much. With each sectoral team working overtime, the drafts of sectoral themes keep changing not only on a daily basis, but on an hourly basis. In fact, when we saw an almost complete draft of all chapters together, we realised that we need to re-estimate some calculations as the base themselves have changed. This was a mad race against time.

[3] DaLA was developed by the UN Economic Commission for Latin America in early 1970s but since been improved through multilateral cooperation of the World Bank, WHO, ILO, UNESCO and other agencies. It provides a flexible toolkit for approximation of damage and losses after disaster strikes (see GFDRR 2017 for an overview).

In addition, the macroeconomic impact exercised faced another hurdle. Some sectoral assessments (chapters) needed baseline scenario to calculate damage and loss. While for a country, or in those scenarios where the entire state is affected, as was the case for Kerala in the 2018 floods, then one uses the recent GSDP of the state and its sectoral components, as a baseline. Cyclone Fani impacted only some districts and the nature of impact was different across districts. In the absence of any recent estimates of gross district domestic product (GDDP) for Odisha, some sectoral teams requested the macroeconomic team to help them in this. To facilitate this, we prepared a policy brief that, on the one hand, estimated GDDP at constant and current prices and was consistent with the state's GSDP, and, on the other hand, provided sub-group consistent population projections before Fani to arrive at proportion of population affected.

The sectoral/thematic DLNA exercise arrived at by multiple teams burning the proverbial midnight oil to arrive at damage (a stock concept) and loss (a flow concept) without double counting between the two broad concepts and also across sectors formed a basis to assess the impact on the economy. Combining the estimated damage and loss gives an economic estimate of the impact of the disaster on the economy. The sectoral DLNA has also suggested recovery and reconstruction to build back better so as to minimise impacts from such disasters in the future. However, the path of recovery and reconstruction is subject to a fiscal constraint as also other macroeconomic factors and natural forces.

We posit a scenario without the disaster and then create two post-disaster scenarios of without any recovery and reconstruction and with full recovery and reconstruction while knowing fully well that the truth will lie somewhere in between these two possibilities. The impact of the loss at the aggregate level was further broken down by economic activities and then drawing from the DLNA identifying those activities that require special attention. Further, by drawing from DLNA one also arrives at the impact of damage and loss across sectoral themes by their ownership structure, public or private, as that would also determine their recovery and reconstruction path.

Yet another important methodological challenge was that the sectoral themes of DLNA is different from the economic activity wise classification of GSDP (primary, secondary, and tertiary and their sub-categories) and both these differ from the manner in which the government allocates revenue and resources across departments, that is, the budget allocations. This is important because we need to identify those department that call for reallocation of revenue and resources to help recovery and reconstruction.

One of the most important questions for any post-disaster macroeconomic exercise is that the disaster reduces the revenue earning capacity of the state, but at the same time calls for greater intervention by the state. It is important to identify the possible fiscal implications within the existing norms and parameters and the structural limitations of the state finances. Besides, it is this that would help the government articulate a case for greater funds, in the case of Odisha, to the Centre as also to multilateral funding agencies.

Based on the exercise, we provide some policy suggestions (or, *DaSa NiTi*, ଦଶନୀତି) for consideration. These are to help Odisha build back better.

3 The Larger Context

Beyond the loss of human lives and damage to assets and production flows across 14 districts, the macroeconomic consequences are considerable. Total damage to existing stock of assets has been estimated at over INR 16,465 crore (around USD 2.4 billion) whereas the economic losses flowing from the disaster are estimated at nearly INR 7,712 crore (around USD 1.1 billion).[4]

Combining the value of damage and losses, the total disaster effect including damages and losses is equivalent to about 5% of Odisha's GSDP of 2018–19, while losses from change in production flows comprise 1.6% of that year's GSDP,[5] and the per capita disaster effect for the population in affected districts is around INR 9,617 (USD 137).

The sectoral chapters of this DLNA exercise suggest that the housing and energy sectors have been particularly affected,[6] and it is of immediate importance to restore the productive means of livelihood. Apart from the direct effects computed as damages and losses, there may be considerable higher order or indirect effects that are likely to persist for the most vulnerable.

The structure of the state's economy is such that the share of tertiary economic activities is the highest, contributing around 42% of the gross state value added (GSVA) in 2018–19.[7] Agriculture and allied economic activities, which includes crops, livestock, forestry and logging, and fishing activities, contributed 18.9% to the state's economy, but employs 48.8% of the workforce.[8] However this economic activity is vulnerable to monsoon variability as well as climate induced natural disasters. Under primary economic activities, apart from agriculture and allied activities, mining and quarrying contributed to 10.8% of GSVA and employed 1.2% of the workforce.

In the secondary economic activities, manufacturing is the highest contributor, at 18.5% while construction, and electricity, gas, water supply and other utility services contributed 6.5% and 3.7%, respectively. The secondary economic activities contributed 28.7% to GSVA and employed 26.4% of the workforce.

Under tertiary economic activities, trade, repair, hotels and restaurants contributed 10.3%; transport, storage, communication and services related to broadcasting contributed 7.5%; financial services contributed 3.4%; real estate, ownership of dwelling and professional services contributed 7.4%; public administration and defence contributed 5.5%; and other services contributed 7.6%. Together tertiary economic activities contributed 41.6% of GSVA and employed 24.8% of workforce.

It is a matter of concern that in 2015 less than 6 lakh (0.6 million) people were in organised employment and more than 82% of them were in the public sector. With a workforce of 1.25 crore (12.5 million), only 6% are in organised employment.

[4] Damages to stock of assets and losses due to change in flow of production of goods and services have been calculated using the DLNA methodology, which was provided to us by UNDP.

[5] GSDP is the value of final goods and services produced in the geographical boundaries of a state in a given financial year, that is, from 1 April of the first calendar year to 31 March of the second calendar year. For instance, 2018–19 refers to the period 1 April 2018 to 31 March 2019.

[6] In this chapter, the term sector is largely used to describe the DLNA sectoral exercise. The discussion on the economy related to GSDP (or other macroeconomic indicators) will largely use the term economic activities that are primary, secondary and tertiary in nature. There may be overlap in some cases.

[7] Discussion on the structure of the economy is based on data pertaining to 2018–19 in current prices provided by the Directorate of Economics and Statistics, Government of Odisha.

[8] The workforce share is taken from National Statistical Office (2019).

In terms of economic growth, Odisha's economy grew at an average of 8% per annum over the period 2012–13 to 2018–19. However, there was a slump in economic growth in 2014–15 when real growth rate fell to 1.8%, largely due to a weakening commodity market. Incidentally, the state was battered by cyclonic storms Phailin in 2013 and Hudhud in 2014.

Following the legislation of the Odisha Fiscal Responsibility and Budget Management (FRBM) Act, 2005 and its subsequent amendment in 2016, the state continues to be revenue surplus and has shown remarkable prudent fiscal management. The state's own revenues grew notably over the past two decades, and the ratio of own tax to GSDP was 6.4% in 2017–18 compared to 3.6% in 1999–2000 when the state, incidentally, was devastated by a super cyclone. However, own non-tax revenue has grown erratically and was less than a third of the own tax revenue in 2018–19. In 2016–17, the year the goods and services tax (GST) was introduced, the growth of both own tax revenue and own non-tax revenue was among the lowest in recent times—with the former registering 1.4% growth while the latter showed negative growth of -7.7%. The fiscal deficit for 2019–20 is projected at 3% of GSDP which is well within the 3.5% ceiling of the Odisha FRBM Act, 2005. However, the debt-stock projection for 2019–20 was higher than 2018–19, at 19.2% of GSDP.[9]

Cyclone Fani is a setback to the state's aspirations to become a fast-growing state and sustain its poverty reduction record. However, it is expected that there may be a spurt in labour demand for construction; resulting in additional wage earnings in the short run. There may also be additional positive as also adverse effects on household consumption and private investment.

We now look up the growth effects of the disaster on the economy and then will examine the differential effects of the disaster across different economic activities—primary, secondary, and tertiary.

4 Estimating Growth Effects on Economy and by Economic Activities

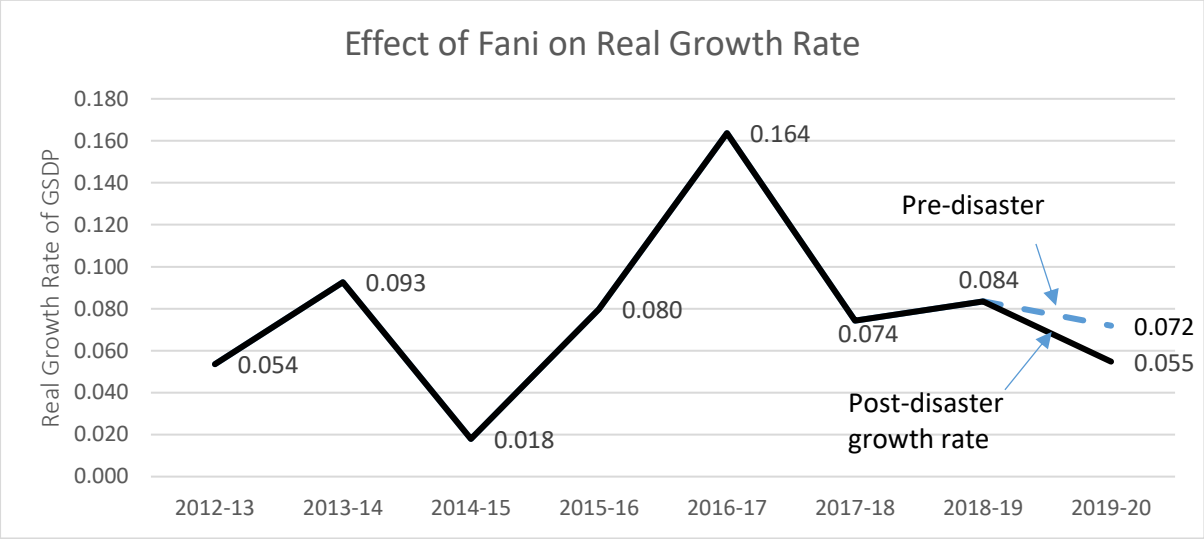
4.1 The Two Extreme Scenarios: Without/With Recovery and Reconstruction

The economy of Odisha grew at an estimated real annual growth rate of 8.4% in 2018–19.[10] The year 2017–18 was particularly adverse for economic growth, as real annual growth rate declined to 7.4% from 16.4% the year before, with agriculture and allied activities registering a decline. All things being equal, losses from Fani, in terms of 'isolated effect' of the disaster, are expected to result in the real annual growth rate falling to 5.5% from a projected 7.2% for 2019–20 (Figure 1).[11] For an improved understanding of how disasters such as Fani could influence the growth of the economy, and consequently the GSDP of Odisha, we present the scenarios of GSDP (2011–12 constant prices) in the post-disaster period under two conditions: (i) without recovery and reconstruction expenditure; and (ii) with recovery and reconstruction expenditure.

The GSDP of the state was INR 4.86 lakh crore (around USD 69 billion at current prices) in 2018–19. Since the disaster occurred in the second month of 2019–20, we posit that income losses will be accounted for in the same year along with the initial injection of capital in the form of recovery and reconstruction expenditure. It can be asserted that the damages to assets can also have long-term implications on income losses.

[9] Statements presented along with the Vote on Account 2019-20, Finance Department, Government of Odisha.
[10] This corresponds to a nominal growth rate of 11.8% over 2017–18 in comparison to the 2018–19 advanced estimates shared by the Directorate of Economics and Statistics, Government of Odisha.
[11] CAGR of 7.2% between 2011–12 and 2018–19.

Figure 1: Annual Growth of GSDP at Constant Prices: Pre-disaster and Post-disaster



Source: Authors' calculation using GSDP series at 2011–12 constant prices provided by the Directorate of Economics and Statistics, Government of Odisha.
Note: Growth rates reported are real growth rates of GSDP. Dashed line links the pre-disaster growth rate projections from 2018–19 to 2019–20.

Table 1: GSDP projections (nominal and real values)

GSDP Indicator	2018-19 Actual	2019-20 Pre-disaster projection	2019-20 Without R&R	2019-20 With full R&R
GSDP, current prices, INR lakh crore	4.86	5.36	5.28	5.63
GSDP, 2011-12 constant prices, INR lakh crore	3.96	4.36	4.30	4.59
GSDP, current prices, USD billion	69.42	76.51	75.36	80.45
GSDP, 2011-12 constant prices, USD billion	56.56	62.32	61.39	66.48

Source: Calculation using GSDP series at current prices and 2011–12 constant prices provided by the Directorate of Economics and Statistics, Government of Odisha.
Note: Exchange rate of 1 USD = 70 INR is used for GSDP calculations in both current and constant prices. GSDP denotes gross state domestic product. R&R denotes recovery and reconstruction.

Table 1 shows the scenario of GSDP projections with and without the recovery and reconstruction expenditure incurred. The actual scenario may lie somewhere between the two scenarios. The inflow of funds due to Fani may partially compensate the losses to GSDP in the first year. Multiplier effects will be limited, as the fiscal multiplier of Odisha is near unity.[12] The growth rate and GSDP in the medium to long term will depend on a combination of several macroeconomic and natural factors.

4.2 Impact by Economic Activities

Understanding the impacts of Fani on different economic activities is based on sectoral assessments of damages and losses in the DLNA. We attempt to explain how the disaster may impact different economic activities by comparing pre-disaster real growth and level of GSVA (2011–12 constant prices) with post-disaster revisions under two scenarios: (i) without recovery and reconstruction, and (ii) with recovery and reconstruction (Table 2).

[12] See, CEFT (2015).

Table 2: Effect of Disaster on Economy by Economic Activity

Activities	Real Growth Rate 2018–19	GSVA (INR crore)by 2018–19	GSVA (INR crore) Pre-disaster projection 2019–20	GSVA (INR crore) Post-disaster without R&R	GSVA (INR crore) Post-disaster with R&R	Real Growth Rate Post-disaster 2019–20	Real Growth Rate post-disaster with R&R 2019–20
Primary							
Agriculture, Forestry and Fishing	0.08	48809	52845	49889	52475	0.02	0.08
Mining and Quarrying	0.04	50638	52813	52773	52800	0.04	0.04
Secondary							
Manufacturing	0.16	82743	95791	95538	95705	0.15	0.16
Electricity, Gas, Water Supply & Other Utility Services	0.04	13489	14033	13696	13936	0.02	0.03
Tertiary							
Construction	0.03	23799	24440	23805	25540	0.00	0.07
Trade, Repair, Hotels and Restaurants	0.07	37446	40008	38566	39179	0.03	0.05
Transport, Storage, Communication & Services related to Broadcasting	0.10	27394	30117	29935	30350	0.09	0.11
Financial Services	0.04	12030	12470	12452	12464	0.04	0.04
Real estate, Ownership of Dwelling & Professional Services	0.06	25861	27413	27390	27405	0.06	0.06
Public Administration and Defence	0.09	20549	22414	22344	22390	0.09	0.09
Other Services	0.00	21377	21385	20927	21374	-0.02	0.00
Odisha	0.08	364135	393729	387314	393617	0.06	0.08

Source: Calculation using Gross Value Added (GVA) by Economic Activity at Constant (2011–12) basic prices, is sourced from the Directorate of Economics and Statistics, Government of Odisha.

Notes: R&R denotes recovery and reconstruction proposed by DLNA in the short-term, that is, first year. Current values of losses are converted to constant (2011–12) prices using ratio of GSVA in constant to current prices for 2018-19 as deflator. Loss and recovery are based on DLNA. They have been intuitively linked to specific economic activity. For instance, DLNA sectors agriculture and fisheries, and environment and forestry are linked to agriculture, forestry and fishing, DLNA sectors of power, WASH, and water resources are linked to electricity, gas, water supply and other utility services, DLNA sectors of transportation/roads, and telecommunications are linked to transport, storage, communication and services related to broadcasting, DLNA sectors of education, and health and nutrition are linked to other services. The cross-cutting DLNA sectors of employment, livelihood and social protection, DRR, and gender and social inclusion are distributed across economic activities as per their employment share for Odisha in *Periodic Labour Force Survey, 2017-18* by National Statistical Office (2019).

In the post-disaster scenario, most sectors of the economy are likely to experience lower growth in 2019–20 (Table 2 column 7) with respect to 2018–19 estimates (Table 2: column 2). Agriculture and allied activities, manufacturing, trade and related activities, transport and related activities, utilities, construction, and public administration and defence activities—all show a decline in real growth rate. 'Other services' comprising education, and health and nutrition of DLNA will register a negative growth rate post disaster. However, upon including the recovery and reconstruction needs as suggested by the sectoral assessment, the growth rates are revised upwards (Table1, column 8). Utilities show the highest increase in the growth rate.

In light of the findings of the sectoral damage and loss assessment, the following economic activities need special attention with appropriate strategies of DRR and to build back better (BBB) for adequate risk mitigation and resilience in future.

5 Economic Activities that Need Special Attention

5.1 Energy

Electricity distribution infrastructure has been hardest hit, with destruction of assets worth INR 8,139 crore (USD 1.2 billion). The losses—in terms of revenue loss to distribution companies (Discoms) and loss in earnings of meter readers—is around INR 254 crore (USD 36 million). However, the post-Fani projection for this sector is likely to be positive with around INR 9,748 crore (USD 1.4 billion) of recovery and reconstruction expenditure estimated under an alternative option that follows the existing system with improved specification, or, as decided by the state. This may have implications for other economic activities.

5.2 Housing

Housing structures suffered damage worth INR 3,075 crore (USD 439 million) and the recovery needs of the sector are estimated to be over INR 8,997 (USD 1.3 billion). Fani has impacted the housing goals of the state, particularly for vulnerable households, including those headed by senior citizens, the differentially-abled, and low-income households. The estimated damage for public buildings is INR 539 crore (USD 77 million). The need for reconstruction in this sector, if met, is expected to boost construction activity in 2019–20 and is likely to result in greater demand for construction workers in the short term.

5.3 Livelihood

Estimation based on the employment, livelihood, and social protection sector of DLNA suggests that around 6.8 crore (68 million) person-days were lost, resulting in wage loss of around INR 2,780 crore (USD 397 million). Mostly affected are workers in the unorganised sector (94% of the state's workforce). Enterprises including handicrafts, micro, small and medium enterprises (MSMEs), and cottage industries have also experienced losses. As a result, livelihoods of affected workers will take time to recover. Agriculture and allied activities have also experienced wage employment loss of around INR 300 crore (USD 43 million). In particular, livelihoods based on coconut and betel vine are likely to experience losses that may have long-term consequences. Fani has also adversely impacted livelihoods in the tourism sector and that of rural artisans and crafts persons in affected areas.

5.4 Agriculture Livestock, and Fishery

With around INR 3,033 crore (USD 433 million) in damages and losses, and recovery needs of INR 2,615 crore (USD 374 million), the agriculture, livestock, and fishery sector is expected to have lower production in the short term. Negative supply shocks in these activities—particularly poultry, dairy, fishery, horticultural produce, and coconuts—is likely to result in short-term inflationary pressures. However, if supply chains ensure availability from other regions such inflationary pressures may not persist.[13]

Recovery and reconstruction from a BBB perspective are expected to result in slight productivity gains, if the production technologies in the affected sector undergo a transformation. Since this sector is particularly susceptible to the vagaries of the monsoon and climatic disasters, DRR expenditure is likely to minimise losses in the long term.

Activities in this sector also employ the highest proportion of the workforce, and unless labour productivity gains are experienced owing to the replacement of old capital or knowledge spill over, the earnings from these activities will continue to be relatively lower than from other

[13] Given the rapid assessment involved in the DLNA exercise, estimation of inflationary pressures though of relevance, was beyond the scope of our exercise.

activities. If there is one lesson from this natural disaster, it is that alternative resilient agro-ecological systems need to be considered.

It is important to damage and loss by ownership structure, which is now taken up. This would be crucial in our plan towards recovery and reconstruction.

6 Damage and Loss: Public versus Private

The damage and loss by ownership is reported across sectors in Table 3. In the productive sector of agriculture, fisheries and livestock, 94.3% of the damages and all losses in the sector are under private ownership. This sector is largely dominated by smallholders and reviving their livelihood should be of paramount importance.

Table 3: Damage and Losses across Sectors by Ownership

Sector	Damage by Ownership (INR Crore)		Losses by Ownership (INR Crore)	
	Public	Private	Public	Private
Productive Sectors				
Agriculture, Fisheries, Livestock	90.8	1494.4	-	1447.5
Infrastructure Sectors				
Energy	8138.7	-	253.5	-
Roads	326.2	-	22.0	-
Water, Sanitation and Hygiene	267.0	-	129.0	-
Water resources & Coastal Protection	5.0	-	-	-
Telecommunications	95.9	348.8	-	-
Social sectors				
Housing and Public buildings	539.2	3075.0	54.0	-
Education and Child Protection	814.0	-	-	-
Health and Nutrition	128.0	-	262.0	-
Tourism & Cultural Heritage	71.8	487.7	-	1334.6
Cross-cutting Sectors				
Employment, Livelihoods and Social Protection	185.2	234.9	-	4105.1
Environment	77.0	-	103.0	-
Disaster Risk Reduction	5.5	-	1.0	-
Total	10744.3	5640.8	824.5	6887.2

Source and Note: Provided by UNDP. From the total damage, ownership between public and private could not be ascertained for INR 80 crore, of which, INR 78 crore is for employment, livelihood and social protection and INR 2 crore is for telecom.

In the infrastructure sector, the entire damages and losses from the sub-sectors of energy; roads; water, sanitation and hygiene; and, water resources and coastal protection are under public ownership. The hardest hit is the energy sector. In fact, 75.7% of the entire damages under public ownership and 30.7% of the entire losses under public ownership are from energy.

The burden from the other sub-sectors under infrastructure constitutes 6.5% of the entire damages under public ownership and 18.3% of the entire losses under public ownership. Under infrastructure, it is only in the telecom sub-sector that some damages have been reported under private ownership. This has to be read with caution as, in the absence of data from private entities, damage has been imputed from information provided by the public entity. The burden of restoring the entire damage under infrastructure sector, except for part of the damages under telecom, seems to have fallen on the state.

In the social sector, the entire damages for health and nutrition, and education and child protection sub-sectors are entirely under public ownership. From the total damages under public ownership, these constitute 1.2% and 7.6%, respectively. In this sector, the entire losses for housing and public buildings, and health and nutrition sub-sectors are under public ownership. From the total losses under public ownership, these constitute 6.5% and 31.8%, respectively. Further, in this sector, damages have been reported under private ownership in the DLNA exercise for housing and public buildings, and tourism and cultural heritage sub-sectors. The damages in these sub-sectors under private ownership are 85.1% and 87.2%, respectively, of the total damages in these sub-sectors. Housing would have largely impacted individuals, whereas tourism and cultural heritage would have adversely affected enterprises. Both need different approaches for revival to pre-disaster levels.

In cross-cutting sectors, the entire damages and losses for environment and DRR are under public ownership. From the total damages under public ownership, these constitute 0.7% and 0.1%, respectively. It is in the employment, livelihood and social protection that 55.9% of damages and entire losses were under private ownership.

Overall, 65.6% of the damages are under public ownership and 89.3% of the losses are under private ownership. From the damages under private ownership, the distribution is largely across housing (54.5%), agriculture, fisheries and livestock (26.5%), tourism and cultural heritage (8.6%), telecommunication (6.2), and employment, livelihood and social protection (4.2%). Private ownership losses employment, livelihood and social protection (59.6%), agriculture, fisheries and livestock (21.0%), and tourism and cultural heritage (19.4%). These are largely among smallholders and the unorganised workforce. The need is substantive and to address this, the state, civil society, and the people concerned need to come together.

Now, with an understanding of the ownership structure, we propose to examine the implications of a shift in the form of opportunity cost of resource allocation to finance the aforementioned highly affected sectors due to the recovery and reconstruction needs that the DLNA has identified. This is followed by an assessment of the fiscal implications of the recovery and reconstruction.

7 Reallocation of Resources and Fiscal Implications

7.1 Reallocation of Resources

In order to understand how the financing of the recovery out of the state's own resources could result in diversion from other expenditure items, we compare the expenditure patterns in 2018–19 (pre-disaster) with the post-disaster needs, assuming the share in expenditure needs to be dictated by the share in recovery needs (Table 4). Remarkably, the top three expenditure items (energy; water supply, sanitation and urban; and, agriculture and allied) would require over three-fourth of the expenditure in terms of recovery needs, while that jointly accounted for less than a fourth of the share in expenditure pre-disaster.

Such a considerable shift in expenditure would necessitate a shift away from other social and economic services. From a developmental outcome perspective, if such a shift is attained at the cost of productive investment in capital formation (including human capital and spending on developmental schemes), the economic impacts of the disaster are gross underestimates.

Table 4: Expenditure Reallocation towards Recovery and Reconstruction

Expenditure item	Share in expenditure in 2018-19 (%)	Share in recovery needs (%)	Share in expenditure following resource reallocation (%)
Energy	0.04	33.77	33.77
Water supply, sanitation and urban	1.09	35.63	35.63
Agriculture and allied	1.83	8.05	8.05
Others	97.04	22.55	22.55

Note: Energy, and agriculture and allied are same as that in the DLNA (Table 2). Water supply, sanitation and urban are similar to the DLNA sectors of water, sanitation and hygiene, and housing and public buildings. 'Others' includes all other DLNA sectors. 'Others' under expenditure items also includes items not covered under DLNA.

7.1 Fiscal Implications of Disaster Financing

Fani has resulted in damages and losses as a result of which the revenue target for 2019–20 may not be met. Given the structure of revenue generation in the state, drop in collection is expected to be high across the sectors such as energy, housing, land administration, agriculture and allied activities. The extent to which the state is able to finance the recovery and reconstruction expenditure will have implications on the progress of fiscal consolidation. The means through which disasters such as Fani are to be financed may impose unforeseen fiscal burdens on the following grounds.

First, in 2018, the corpus of the contingency fund was increased from INR 400 crore (USD 57 million) to INR 1,400 crore (USD 200 million) in 2018 and there has been an increase of the State Disaster Relief Fund (SDRF) corpus to INR 919 crore (USD 131 million) in 2019–20.[14] However, these amounts will not be enough to finance disaster-related recovery and reconstruction.

Second, INR 900 crore (USD 129 million) has already been spent under loans from the World Bank on the Odisha Disaster Recovery Project (ODRP), to partially fund reconstruction following Phailin and Hudhud. The state has also borrowed from the National Bank for Agriculture and Rural Development (NABARD) for flood control and spent over INR 1,000 crore (USD 143 million) on disaster prevention, including on cyclone and flood shelters. The state has also planned an investment of INR 700 crore (USD 100 million) for the purpose of building disaster-resilient power infrastructure and disaster response centres.[15] These may limit the possibility of seeking additional resources.

Third, in spite of gradual increase in own tax revenues (from 6% of GSDP in 2016–17 to 6.4% of GSDP in 2019–20), avenues to raise own tax revenues in the medium term are limited by a low tax base, low tax buoyancy of less than unity.[16] The largest component of own tax revenues is goods and services tax (GST), but following its introduction in 2017 that subsumed several state and central taxes, the state has lost substantially. Sales tax/VAT has registered a decline and is estimated at around 1.6% of GSDP in 2018–19.[17] Excise duties continue to grow steadily

[14] Brief Note on Short Release of Central Share of SDRF for the Year 2019-20, Finance Department, Government of Odisha.
[15] Based on interactions with officials of state Finance Department.
[16] Nabakrushna Choudhury Centre for Development Studies (2019).
[17] Value added tax (VAT) is levied on six items including petroleum products and liquor.

but other own tax revenue source such as registration fees, stamp duties, and motor vehicle tax are not buoyant. Electricity duty has registered growth but it continues to have a low share (0.52% of GSDP). It is also a matter of concern that professional tax revenue has fallen from 0.07% of GSDP in 2010–11 to 0.05% of GSDP in 2018–19 despite services sector-led growth of the economy. Own non-tax revenues comprise 2.32% of GSDP in 2018–19, with interest receipts having a higher share than dividends and payoffs.[18]

Fourth, transfers from the centre are limited in reach from a disaster financing perspective because the trend of growing grants and tax devolution (Table 5) is largely to implement centrally-sponsored schemes (CSS).

Table 5: Central Transfers as Percentage of GSDP

Items	2014–15	2015–16	2016–17	2017–18 (RE)	2018–19 (BE)
Tax devolution	5.15	7.12	7.51	7.52	8.25
Grants	4.11	4.27	4.00	5.51	5.58
Central transfers	9.26	11.39	11.51	13.03	13.83

Source: Finance accounts of various years and budget documents of 2018–19, Government of Odisha.
Note: Figures reported are percentages of GSDP. RE denotes revised estimates. BE denotes budget estimates.

Fifth, there is a need for rationalisation of expenditure, both revenue and capital account. On the revenue account, the state has an increasing expenditure requirement given higher salary expenditure, pending arrears of the 7th Pay Commission, and burgeoning pension allocation. With respect to the capital account, the state is committed to raise capital outlay by increasing budgetary support for infrastructure spending. Therefore, any diversion of resources towards disaster financing is likely to impact the developmental outcomes.

Sixth, interest rate payments and debt servicing liabilities of the state is expected to go up in 2019–20 (Table 6).[19] It is worth noting that there is not only a marked increase in the share of debt in the GSDP but also an increase in share of debt stock in GSDP. Further, debt projection for 2019–20 has exceeded INR 1 lakh crore (USD 14.3 billion).

Table 6: Debt and Interest Payment Obligations

Year	Debt stock as % of GSDP	Debt stock as % of revenue	Interest payment as % of revenue receipt
2016-17	16.2	86.6	5.4
2017-18	17.0	86.7	5.9
2018-19 (RE)	18.0	86.0	5.7
2019-20 (BE)	19.2	93.8	5.9

Source: Finance accounts of various years and budget documents of 2018–19, Government of Odisha.
Note: GSDP denotes gross state domestic product.

Given the limitations for disaster financing, the recovery and reconstruction expenditure due to Fani has to be largely met from grants from the centre and multilateral organisations, and soft loans from national and international agencies. Any market-based risk financing alternatives that incorporate principles of risk layering and risk mitigation may be dealt with caution, as they could have future welfare implications. Some policy suggestions based on the macroeconomic impact assessment are presented below.

[18] Finance accounts of various years and budget documents of 2018–19, Government of Odisha.
[19] Statements presented along with the Vote on Account 2019–20, Finance Department, Government of Odisha.

8 Policy Suggestions: The DaSaNiTi (ଦଶନୀତି)

The state of Odisha is vulnerable to frequent natural disasters and is coping with yet another hydrometeorological event that has put a spanner in the wheel of economic growth and poverty reduction. With damages and losses estimated at 5% of GSDP, the needs for recovery and reconstruction have to be structured judiciously. Additional expenses have to be undertaken in a manner that does not sacrifice future growth and jeopardises fiscal prudence. Going forward, the following ten suggestions (DaSaNiTi, ଦଶନୀତି) deserve policy attention.

First, Odisha should be given special treatment by the Centre on account of its chronic vulnerability and exposure to frequent natural disasters. At present, allocation of funds for disaster relief from the Centre is based on actual expenditure in the past—this places Odisha at a disadvantage. There are several exclusions in the State Disaster Response Fund (SDRF) legislation that limit the ability of the state to finance restoration of public infrastructure. The allocation of funds from the Centre under disaster relief should be based on the severity, impact, and need assessment, rather than on actual expenditure in the past.

Second, the per capita Net State Domestic Product (NSDP) of Odisha is 71.8% of the national average (at current prices) in 2017–18. This is likely to have declined post-Fani. Moreover, an estimate in in terms of the income-poor in the pre- and post-Fani scenarios, suggests an increase in incidence of poverty in the state by five percentage points; taking it back to the 2011–12 level of 33%, which itself was worse than the all-India incidence of 22% (Mishra and Hari, 2019). In light of the substantive human impacts of natural disasters like Fani, multilateral agencies should consider Odisha as a special case in extending grants and concessional loans, as provided to low-income countries.

Third, given fiscal implications of financing recurring natural disasters, the Government of Odisha can consider accessing low-cost loans from NABARD's Rural Infrastructure Development Fund (RIDF), particularly to address DRR and BBB requirements. In addition, the Global Facility for Disaster Reduction and Recovery (GFDRR) may also be accessed for capacity building and technical assistance pertaining to DRR.

Fourth, in light of the damages and losses on infrastructure being largely under public ownership (except for part of the damages under telecom), places an excessive fiscal burden on the state. One may start with an infrastructure risk pool in the telecom sector, such that the burden on the state is minimised.

Fifth, there is some discussion in favour of risk-layering and exploring possibilities of market-based risk transfer instruments—such as 'catastrophic bonds' or 'cat bonds'. It should be noted that in the past, the state has participated in arrangements for prepayment of high-cost market borrowings, debt swaps and buy-back of high cost loans. These and the excessive fiscal burden on the state may call for looking into other possibilities. However, structuring disaster financing mechanisms such as cat bonds calls for due cognisance of associated risk factors. In particular, it should be kept in mind that such bonds are generally floated in advanced economies, where there is an appetite for greater risk and returns. In low risk and low return situations, cat bonds are not successful.

Sixth, to revive livelihoods across sectors, appropriate investments in capacity building and skilling needs to be emphasised. For instance, it has been reported that some of the young trainees under 'Skilled in Odisha' contributed in the post-Fani recovery activities. Institutionalising and incentivising the youth to participate in DRR and BBB should be considered.

Seventh, the agriculture and allied activities sector provides the highest employment but is also vulnerable to climatic shocks. Therefore, alternative resilient farming systems like the zero budget natural farming (ZBNF) initiative of Andhra Pradesh—which has demonstrated that impact from cyclones such as Pethai and drought had lower adverse impacts when compared with input intensive methods—should be promoted.[20] A similar initiative from the state is the Odisha Millets Mission, which should converge with integrated farming and other agro-ecological initiatives. These are win-win alternatives for the farmer, the consumer, and the planet.

Eighth, as the damages and losses under private ownership fall largely under agriculture and allied, housing, and employment, livelihoods and social protection, they are likely to affect the smallholder, the populace without safe housing and the workers earning a livelihood through unorganised employment—or, largely, the bottom 50% of the population. Addressing these requires the pooling of resources from non-governmental organisations (NGOs), civil society organisations (CSOs), and international development partners to facilitate recovery, as the Government of Odisha alone will not be in a position to take this up.

Ninth, lest we forget, it is the people who have been affected who should be important players in their recovery. Their resilience itself will be a strength. They may also provide localised low-cost suggestions to address their requirement (for instance, producing and using raw materials required for housing from locally available resources). In involving people, it should also be kept in mind that the process does not exclude even a single individual.

Last, but not the least, as an afterthought, any DLNA exercise will benefit from timely access to updated data across the line departments. The time delays in DLNA become critical, given the window of risk for vulnerable households to slip from transitory shocks to structural poverty. This necessitates that the state also invests in upgrading its statistical system. On a related note, for an improved understanding of impacts of disasters and for studying general equilibrium effects, appropriate input-output tables and social accounting matrices (SAM) for the state economy can be developed.[21]

9 Concluding Remarks

In order to assess the macroeconomic impact of Fani on the economy of Odisha and to provide policy suggestions, we first created a baseline scenario (Mishra, Gaurav and Nathan, 2019) that fed into the sectoral/thematic exercise. And, then drawing from the DLNA exercise and suggested path towards recovery and reconstruction, we provided two extreme counterfactuals – without/with recovery and reconstruction. After identifying the activity wise impact, their ownership structure, need for prioritisation, and structural limitation of state finances, we provided some policy suggestion (or, *DaSa NiTi*, ଦଶନୀତି) for consideration. In fact, some of these have already been taken into consideration by the state.

[20] Webinar, 'Growing the new Green Revolution: Zero Budget Natural Farming in Andhra Pradesh,' Global Sustainability Institute, Anglia Ruskin University, East Anglia, UK, 25 March 2019.

[21] In the short term, general equilibrium effects should not be attempted, due to lack of information on relative prices as recommended in the GFDRR guidelines.

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